

**Closed preferred provider networks in pharmacy and their potential impacts on patient autonomy, access to care, continuity of care, and the safety and effectiveness of drug therapy.**

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## Statement of expertise

I am a licensed pharmacist in Ontario and an Associate Professor at the University of Waterloo School of Pharmacy, holding a Bachelor of Science in Pharmacy from the College of Pharmacy and Nutrition at the University of Saskatchewan (2006) and a Doctor of Philosophy with a focus on pharmacy practice research from the Department of Medicine at the University of Alberta (2014). My clinical experience spans hospital, home care, community pharmacy, and primary care clinic settings, including practicing to full scope with Additional Prescribing Authorization (Alberta, 2009-2014) and Authorization to Administer Injections.

My research evaluates the clinical, economic, and societal outcomes of pharmacy practice to full scope utilizing quantitative and qualitative methods and economic analysis, and has resulted in peer-reviewed publications in topics of relevance to this report including:

- Ethical tensions in community pharmacy practice related to sales of products harmful to health (e.g., unhealthy foods) or lacking clinical evidence of safety and effectiveness,<sup>1</sup>
- Health professional regulation and disciplinary action taken against health professionals,<sup>2-7</sup>
- The geographic accessibility of community pharmacy services, including rural or remote communities, the availability of French language pharmacy services, and service availability in relation to community-level socioeconomic status measures,<sup>8-11</sup> and
- The impact of performance-based payment on health professionals' practice.<sup>12-14</sup>

I have contributed to advisory committees related to medication safety, pharmacist practice, and pharmacist competence assessment, have served as an assessor for licensing examinations for Canadian pharmacists and pharmacy technicians, and have served as a member of the Alberta College of Pharmacists Hearing Tribunal. As an educator within the Professional Practice Series within the University of Waterloo's Doctor of Pharmacy (PharmD) program, I teach students on providing patient care in alignment with the profession's code of ethics and standards of practice and am versed in Canadian competency requirements for licensure to practice pharmacy.

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## Aim of this report

I have been requested to provide an expert opinion related to the impacts of preferred provider networks (PPNs) on patient safety and pharmacy practice. I have prepared a report that describes the actual and potential impact of PPNs on patient care and safety; these include, but are not limited to, accessibility, continuity of care, and the pharmacist-patient clinical relationship.

## Definitions

- **“Payer”** refers to sponsors, insurers, benefit managers, and administrators involved in the provision of employer-funded private health benefits, including prescription drug coverage.
- **“Plan member”** refers to an individual with third-party coverage for health services, who may also be referred to in this report as a “patient” of a pharmacy.
- **“Preferred Provider Network (PPN)”** refers to a contractual business relationship between a payer and a select network of providers (in this case, pharmacies) who agree to provide services to plan members at a discounted rate to the payer in anticipation of a greater number of plan members being directed to those providers. Subtypes include:
  - **Closed PPN:** Payers enter into (largely confidential) agreements with select pharmacies for some or all drugs for plan members. *Closed PPNs will be the focus of this report.*
  - **Open PPN:** Payers set prices they are willing to pay and pharmacies can opt in to an agreement to meet those prices for plan members.
  - **Mandatory participation:** Plan members are only covered for drugs if dispensed by a PPN pharmacy.

- **Non-mandatory participation:** Plan members can get drug coverage through any pharmacy but get preferred prices if dispensed by a PPN pharmacy.
- **Vertically integrated pharmacy:** A pharmacy that is owned by a payer organization and provides services to plan members with the aim of lowering operations costs and introducing a new source of revenue for the company.
- **“Drugs”** typically refers to Health Canada approved products with a Drug Identification Number; however, in this report, this term may be used across drugs, vaccines, and/or other products (e.g., glucose testing supplies for people with diabetes, nutritional products) dispensed by pharmacies and covered by a payer.
- **“Specialty Drugs”** refers to drugs that require specialized knowledge and services to manage complex diseases and treatments, defined further as those that:<sup>1</sup>
  - Treat chronic, debilitating diseases,
  - Can be indicated for the treatment of common or rare conditions,
  - Cost  $\geq$ \$10,000 per year,
  - Benefit from enhanced patient education from healthcare providers to maximize safety and effectiveness,
  - Need to meet specific delivery and handling requirements,
  - Involve rigorous clinical monitoring,
  - Require individualized dosing and patient education beyond traditional dispensing to maximize drug effectiveness, safety, and appropriate use, and
  - Typically have detailed testing regimens to promote greater likelihood of successful outcomes for patients.

## Data sources and overview of themes

Published academic and scientific literature was searched for research and commentary on the impact of PPNs and related consequences for out-of-network provider use (e.g., co-payments, deductibles) on issues including, but not limited to, medication adherence, access to pharmacy care, patient choice of pharmacy and/or pharmacist, and patient safety including continuity of care.

Key findings have been summarized into five themes, described further in subsequent sections:

**1. Restriction of choice of pharmacy/pharmacist is inconsistent with patients' wishes.**

- Patients value the ability to choose their care providers based on factors including their accessibility, interpersonal skills, and an existing relationship. By 'channeling' plan members to PPN pharmacies, patient choice is compromised, contrary to these wishes.

**2. Patients, including those with low financial literacy and greater healthcare needs, may be precluded from rational decision-making in choice of pharmacy provider.**

- Making rational decisions requires complete information, unrestricted cognitive abilities, consistent preferences, willpower, and the ability to foresee needs. Low health and financial/numerical literacy coupled with the complexity of health services means that patients may be unable to understand complex coverage or the consequences of choosing an in-network vs. out-of-network pharmacy.

**3. Geographic and technologic accessibility challenges may negatively impact patient access to in-person or mail-order pharmacy services within PPNs.**

- Pharmacies within closed PPNs, or PPNs that deliver drug products through vertically integrated mail-order pharmacies, may be less accessible to patients due to their geographic location and/or by necessitating that patients be technologically proficient to access pharmacy services. This may particularly disadvantage residents of rural or remote communities with fewer local pharmacy options and those without consistent access to transportation or technology.

**4. Implications of PPNs on out-of-pocket payments may force patients to choose between their preferred pharmacy care provider and being able to take medications as prescribed.**

- When in-network pharmacies are inaccessible geographically or technologically or when a patient chooses to maintain an out-of-network pharmacy because of non-financial benefits it offers, the plan member will subsequently face higher co-payments. Out-of-pocket costs associated with out-of-network pharmacy services may compromise adherence to treatment, with subsequent negative impacts on health outcomes and quality of life.

**5. Fragmentation of care across multiple providers can have detrimental effects on patient safety.**

- A pharmacist's ability to fulfill their professional responsibility of ensuring the safety and appropriateness of medications dispensed is dependent on the quality and comprehensiveness of information available to them. In the absence of a complete common shared electronic health record across all providers and inclusive of all



residents (which is currently the case in Ontario), this is best achieved by using a single, consistent pharmacy. Pharmacists' ability to ensure the safety and appropriateness of therapy may be hindered by PPNs that only provide select drugs (e.g., specialty drugs or chronic medications only) or when urgent drug therapy is required that is not easily accessible from in-network pharmacies.

# Themes

## 1. Restriction of patient choice

### **Patients highly value their ability to choose care providers.**

An international scoping review identified 118 research studies examining the determinants of patient choice of healthcare providers between 1995-2011.<sup>2</sup> One study within this review surveyed over 2,000 patients in the United Kingdom who were referred from primary care to a hospital-based outpatient clinic on their preferences related to their ability to choose which clinic/provider they were referred to. Notably, this survey was conducted **following the introduction of legislation requiring that patients being referred to their first outpatient appointment be provided their choice of any provider** within the National Health Service or the private system. While all patients reported valuing their ability to choose who provides them with care, some subgroups were especially impacted, including:<sup>3</sup>

- Older patients,
- Those who identify as female,
- Those with a longer travel distance to care, and
- Those who were less highly educated.

The reasons for these populations particularly valuing patient choice are likely multi-faceted – for example, older patients may have more complex medical histories and subsequently desire a

provider with greater perceived clinical skill and experience in their areas of need. Women generally have more health system encounters and longer consultations than men,<sup>4-5</sup> and gender gaps in the quality and effectiveness of health care received exist that disadvantage women and gender minorities, which may motivate them to exercise more control over their care.<sup>6</sup> The authors of the above research also hypothesized that “Perhaps less educated patients, from lower socioeconomic groups, placed more importance on the opportunity to choose, as their choices were more limited to begin with – they were unable to afford private treatment, and may not have had the contacts and knowledge to make the most of the [previous system before being offered choice in provider].”<sup>3</sup>

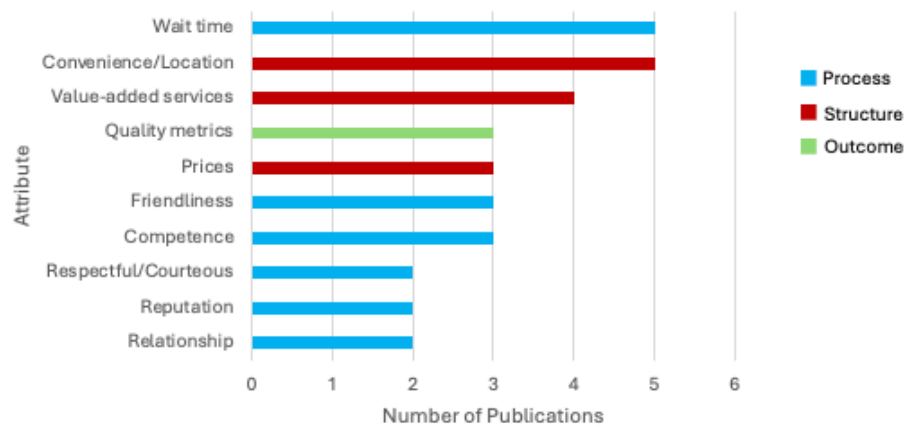
The overall scoping review reported that how a patient chooses a provider and their eventual choices are determined by an interplay between patient and provider characteristics, with provider characteristics spanning three domains:<sup>2</sup>

- **Structure of the health system.** The leading factor in this domain was accessibility and travel distance to the care provider, with patients being generally averse to travel time to receive care,
- **Process of receiving care.** Leading factors in this domain were interpersonal characteristics of the health professional and time spent waiting to receive care, and
- **Outcome indicators.** However, evidence was highly mixed with one-third of papers examining this factor reporting that it had weak or no influence.

As such, far more important to patients than the outcome of their care is the ability to choose their care provider, with preference placed on receiving care in a setting that is convenient and accessible, and from a provider with whom they have a good interpersonal relationship.

The authors concluded that: “Choice of a healthcare provider does not seem to be as straightforward a process as is sometimes assumed in health policy, i.e. that patients look for high-quality care while minimizing cost and ‘vote with their feet’ by choosing the provider that best fits their needs and preferences.” Indeed, structure and process indicators were found to be more influential than outcome indicators and some populations (especially women and those with lower income) who highly desire choice may be negatively affected by PPN restrictions that preclude the ability of plan members to choose the provider who they feel will facilitate the best outcomes related to their health and quality of life.

A systematic review by Patel *et al.* examined factors influencing patient choice of community pharmacy in the United States from 2005-2018 across 10 studies.<sup>7</sup> Similar to the above findings, the attributes of pharmacy care providers most valued by patients were structural and procedural, rather than outcome based:



NOTE: Figure presents the *number* of publications reporting on each attribute and **does not** rank them by relative importance

Pharmacies entering a PPN agreement do so with the expectation of attracting and retaining more insurance plan members as patients – a phenomenon also referred to as “channeling.” However, research has shown that consumers are largely very reluctant to leave the pharmacy they normally patronize.<sup>8</sup> Among 1,875 respondents to a Dutch survey, 97% reported having a “regular” pharmacy with 85% being with that pharmacy for >5 years. Of the minority of respondents who had switched pharmacies, this was due to moving to another city 80% of the time. Such hesitancy to change pharmacy providers is related to trust in one’s current provider and a desire for continuity of care.

### **Canadians disagree with insurer-driven “channeling” for pharmacy care**

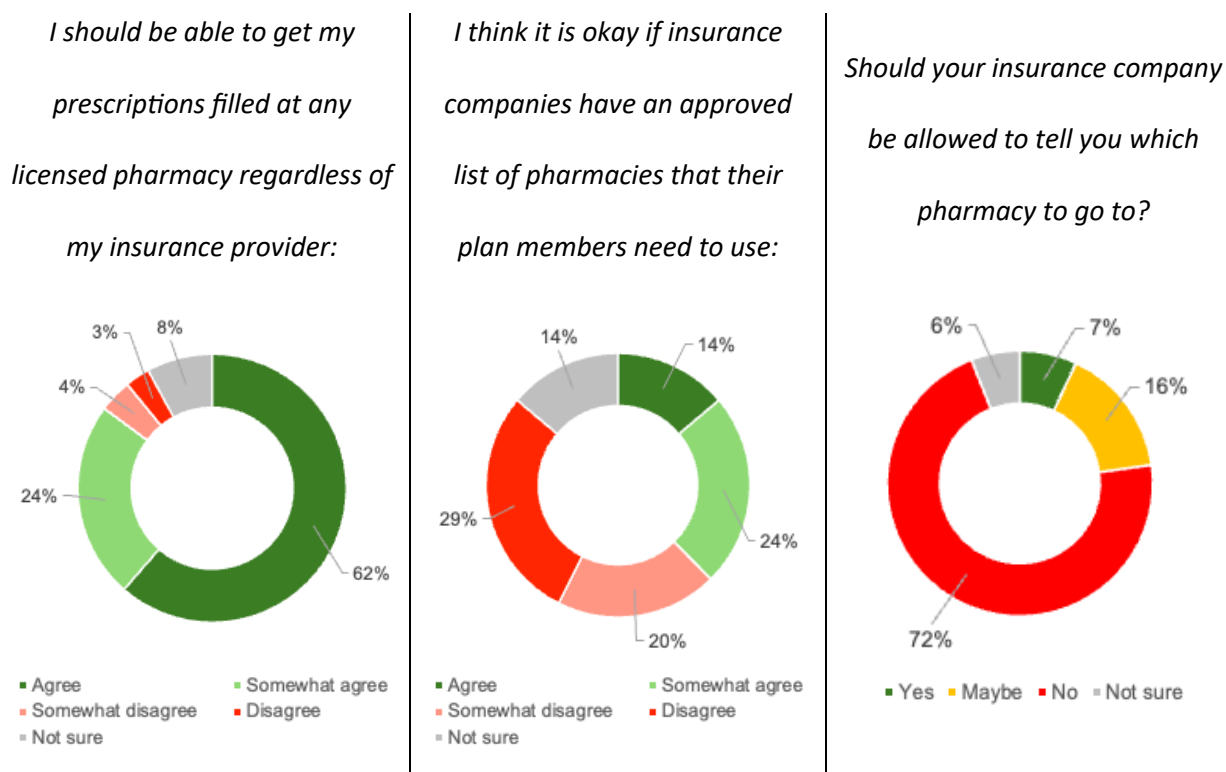
Peckham *et al.* have reported five common preferences related to health services held by Canadian patients that were generally described to be of equal importance:<sup>9</sup>

- Personalized care,
- Information on resources available and how to navigate the system,
- Choice in treatment, care setting, and/or care provider,
- Holistic care and non-medical supports to overcome barriers to accessing care, and
- Care continuity.

While it is well understood that those who are medically complex or belong to historically medically disadvantaged populations have a strong desire for choice of care setting and/or care provider, patient choice is also important for healthy ‘walking well patients’, defined in the literature as “those who use primary preventive and alternative care to maintain health and well-

being”<sup>9</sup> – the demographic that is most likely to hold an employer-sponsored drug insurance plan that may include a PPN.<sup>10</sup>

A survey commissioned by the Canadian Pharmacists Association among 1,919 adult Canadians in December 2023 (unpublished data, used with permission) found that the majority of Canadians agree that they should be able to choose their own pharmacy without direction from an insurer:



The survey also found that 8% of respondents (equivalent to approximately 3 million Canadians), and approximately 10% of Canadians with private health insurance, have been influenced to switch pharmacies in the last 5 years by their health insurance provider.

Therefore, while most Canadians believe they should be able to choose their pharmacy without being influenced by insurance companies, their ability to do so is being negatively impacted by PPN arrangements. This influence will only increase with time. As discussed below (Theme 4), insurers will likely exert even greater influence going forward as drug costs and costs of living continue to increase, placing a greater financial burden on patients.

## 2. Informed and rational decision-making in choice of pharmacy provider

**“Policy makers assume that patients selectively choose high-quality providers based on weighing up the information about the different providers: in other words, that they make a rational choice. For patients to be able to choose as this assumes, they need complete information, unrestricted cognitive abilities, consistent preferences, willpower, and the ability to foresee their needs. However, several studies suggest that these conditions are rarely satisfied, and most patients are consequently unable to make a completely rational choice.”<sup>2</sup>**

A survey of 1,292 adults in the United States demonstrated that the majority of respondents had little to no understanding of health insurance terms.<sup>11</sup> Other studies have indicated that adults have low health literacy and face difficulties with understanding insurance coverage and applying insurance plan criteria and require support when navigating health insurance coverage.<sup>12</sup>

In the Canadian context, these results may be even more pronounced. The U.S. lacks a comprehensive universal publicly funded health system, with more widespread use of private insurance that is either employer-provided or self-purchased, even for medically necessary care.<sup>13</sup> While the proportion of residents in each country with private drug plan coverage is similar (86.8% in the United States versus 80% in Canada),<sup>10,14</sup> overall familiarity with private insurance terminology and coverage criteria is likely higher in the United States since private coverage also applies to hospital and physician services and is therefore potentially encountered and navigated



more frequently than it is in Canada, where those services are covered by a publicly funded healthcare system.<sup>15</sup>

While research is lacking on Canadians' understanding of the terms of private health insurance coverage, it has found that the Canadian public lacks literacy in related areas including finance,<sup>16</sup> tax,<sup>17</sup> and auto insurance,<sup>18</sup> and that one in three Canadians haven't read their home or auto insurance policy.<sup>19</sup> Similar challenges with understanding and navigating health insurance can be expected, with additional complexity involved when navigating closed PPNs where differences in coverage exist across in-network versus out-of-network providers.

Payers' marketing efforts and insurance policy documentation may also not fully explain all options available to plan members with the aim of channeling patients to PPN partners (including vertically integrated pharmacies). Pharmacists have reported receiving alerts from payers when electronically submitting a prescription drug claim stating that the patient must call a payer's customer service line to continue to receive drug coverage. During this call, the patients report being pressured to transfer their prescriptions to a vertically integrated pharmacy. A recent news story described a similar approach being taken with a Waterloo, Ontario teacher regarding her specialty drug for ankylosing spondylitis, a type of arthritis.<sup>20</sup> A letter from her insurance provider states, "If you do not speak with a member of the [PPN] pharmacy team, you will be responsible for paying for the cost of these high-cost specialty drugs." Pharmacists have also reported receiving prescription transfer requests from vertically integrated pharmacies which the patient reports not having initiated or understood fully.

In such cases, patients may not be providing consent for these pharmacy-provided health services, as the *Health Care Consent Act* requires that patient consent be informed, given voluntary, and not be obtained through misrepresentation.<sup>21</sup> The Ontario College of Pharmacists further reminds pharmacy professionals that: “The Code of Ethics expects registrants to respect the patient’s autonomy and their right to be an active decision-maker in their care. Registrants must be honest in dealing with patients and not influence, persuade, or pressure them to accept pharmacy services.”<sup>22</sup>

Regulations must be enacted to protect patients’ right to consent to the care they receive, and to protect the public from incomplete or misleading information on their options and pressure to use preferred pharmacies. This is particularly important because pressure and coercive tactics may disproportionately impact those with lower literacy or cognitive abilities, or who lack the resources or willpower to question such practices.

### 3. Accessibility challenges

#### **Residents of rural, remote, or northern communities may be disproportionately impacted by fewer physical pharmacy options**

Patients living in rural or remote communities have fewer local brick-and-mortar pharmacy options overall and face greater travel distances to access in-person pharmacy services.<sup>23</sup> Further reduction in local pharmacy options due to PPN agreements disproportionately impacts access to care for these populations, especially when in-person pharmacist care is desired or required (e.g., for point-of-care testing or vaccination services). As discussed above (Theme 1), socioeconomic status may also impact a person's willingness and/or ability to access care,<sup>24</sup> with those who have greater travel distances to care providers having stronger preferences to choose where to receive care.

#### **Most patients prefer in-person pharmacy care and have concerns over the safety and effectiveness of mail-order pharmacy services**

Mail-order pharmacies (also referred to as online pharmacies or internet pharmacies) are licensed pharmacies that deliver dispensed drugs to patients via mail or courier service. While they may have broad geographical reach, challenges related to the storage and stability conditions of dispensed drugs (particularly those which must be stored within narrow temperature ranges), delays in the initiation of therapy due to the need to accommodate shipping times, and the need for technological skill to navigate web-based interactions with the pharmacy have been identified and will be discussed further below.

A 2021 survey of U.S. residents found that the vast majority (85%) prefer getting their prescription drugs from a local pharmacy rather than from a mail-order company, with the top reasons being:<sup>25</sup>

- My pharmacist knows me better than a mail order company (36%),
- My pharmacist can answer my questions and counsel me on how to use the drugs (32%),  
and
- I'm worried that mail order drugs can get lost in the mail, exposed to the elements, or stolen (15%).

A 2020 survey of U.S. pharmacists reported that 98% had received reports from patients or their caregivers about problems with mail order prescription deliveries in the last six months, including:<sup>26</sup>

- Product arrived late or not at all (97.7%),
- Patient needed counselling on use of the product including proper administration, storage, and/or side effects (71.1%),
- Product was left outside in harsh conditions (60.2%),
- Supply of product was more/less than patient was supposed to receive (43.8%),
- Wrong product delivered (26.2%),
- Product delivered to the wrong address (25.5%),
- Product was stolen, damaged, or tampered with (17.5%), and
- Product was opened by the wrong household occupant such as children or pets (15.3%).

These reported problems can pose risks related to the integrity and effectiveness of the product as well as the safety of patients and those around them (e.g., minors) or the broader community should theft and diversion occur. This report also found that the burden of correcting these problems often falls to community pharmacists. To assist patients experiencing difficulties obtaining their mail order prescriptions, the pharmacists surveyed reported that they have:

- Provided a short-term emergency supply of medication (92.0%),
- Called the insurer for a prescription refill override (80.7%), and/or
- Called the prescriber for a replacement prescription (78.2%).

In addition, and as discussed in greater detail below, pharmacists have also reported being asked by patients and mail-order PPN pharmacies to receive and store medications which require cold chain maintenance when a patient is unable or unwilling to accept delivery at their home.

Community pharmacists often perform such corrective services at little to no cost and assume liabilities for doing so. Community pharmacies have no obligation to augment or correct services provided by PPN pharmacies to their patients but do so out of a professional duty to assist a patient in need.

Concerns with mail-order pharmacy services related to shipping conditions and technologic accessibility will be discussed here, with concerns related to delayed initiation of therapy and policies limiting drugs available through mail-order pharmacies discussed further below (Theme 5):

*The integrity of medications requiring strict storage conditions can be impacted by shipping*

Health Canada maintains guidelines on the environmental control of drugs during storage and transportation that apply to all parties within the supply chain, from the point of manufacture to the delivery of the product to the patient.<sup>27</sup> These guidelines list environmental controls that are essential to maintaining drug safety, quality, and efficacy as temperature, humidity, exposure to light, and limits to physical stress. Storage deviations may impact drug efficacy and/or patient safety and may also result in financial burden if drug products require disposal due to improper storage.

Most solid dosage forms (e.g., tablets, capsules) are ideally stored at room temperature without exposure to excess humidity and protected from light. This is because elevated temperature and light can accelerate the rate of chemical reactions (e.g., degradation of active ingredients and/or the generation of secondary byproducts),<sup>28-29</sup> while humidity can increase decomposition and impact the rates of dissolution and absorption once consumed.<sup>30</sup> Products in liquid form often require refrigeration within a narrow temperature range (2-8°C, called the “cold chain”) to maintain stability. Biological medications (often implicated within closed PPNs due to their high cost) similarly must often be stored within narrow temperature ranges and cannot be shaken as this could destroy the large protein structure of the medication.<sup>31</sup> In all cases, improper storage of medications can contribute to patient safety risks and suboptimal effectiveness, particularly for medications requiring cold chain maintenance.

The need to maintain patient confidentiality augments the handling risks associated with mail order dispensing of drug products. While pharmacists are experts in medication storage and

handling conditions and make great efforts to maintain them, the same cannot be said of postal workers and couriers. Ontario regulations require that prescription drugs for Ontarians be delivered using registered mail or another delivery method requiring a signature on delivery; however, exceptions can be made with documentation of the circumstances leading to it although what constitutes an acceptable circumstance is not defined.<sup>32-33</sup> In addition, packages are often not labelled as containing drug products to preserve patient privacy and confidentiality. Warnings and cautions (e.g., requirements for cold chain maintenance) may also go unnoticed or unheeded, if they are noted in the first place.

When a signature is not required, packages containing pharmaceuticals may be left in a mailbox or unattended outside. Research conducted by the U.S. Food and Drug Administration has found that temperatures inside a mailbox reach up to 58°C when the ambient temperature is 38°C<sup>34</sup> – well outside of room temperature storage conditions of 15-30°C. Wide temperature variation across Canada’s geography with additional seasonal variation also cannot be predicted and controlled for, and inclement weather can impact delivery times. Even when a signature is required, storage conditions cannot be ensured in the interim if the recipient isn’t home at the time of the attempted delivery and delivery is either re-attempted at a later time or day or is left at a physical location (e.g., post office) for pick-up by the recipient.

Despite a mail order pharmacy’s best effort at the time of shipment, breaches or delays at any step prior to a shipment reaching the patient can result in late or missed doses or the use of products with potentially compromised stability and efficacy.

To try address this, some pharmacies within closed PPNs offer patients the option of having a refrigerated medication shipped to a local brick-and-mortar community pharmacy for pick-up; however, practical and legal considerations lead many pharmacies to be unwilling to accept such shipments. Local pharmacies assume liability for the integrity of products they dispense until the point of hand-off to the patient. They do so with the assumption that the product was properly stored and handled upon delivery to the pharmacy by pharmaceutical wholesalers who have the infrastructure and protocols in place for proper transport of pharmaceuticals and who are, in turn, liable and insured should any issue occur in the delivery process.

By contrast, local pharmacies are hesitant to accept products shipped over a long distance from a PPN pharmacy through a mail service or courier, especially for expensive and highly storage-sensitive medications like specialty drugs, which are often target products for closed PPNs. From a business perspective, a local receiving pharmacy would accept legal liability often without being remunerated by the mail-order pharmacy for this liability or their costs associated with storage and dispensing.

Furthermore, standards of practice for Canadian pharmacists also state that they must “ensure that prescriptions are therapeutically and clinically appropriate for the unique needs, goals, and preferences of the patient before release,” educate the patient on the prescription, and monitor response to therapy.<sup>35</sup> Physically distributing a prescription product for a patient that is provided to you by another pharmacy does not absolve the receiving pharmacy from those responsibilities. Failing to perform these responsibilities would be considered professional misconduct and could lead to regulatory action from provincial regulators of pharmacists.



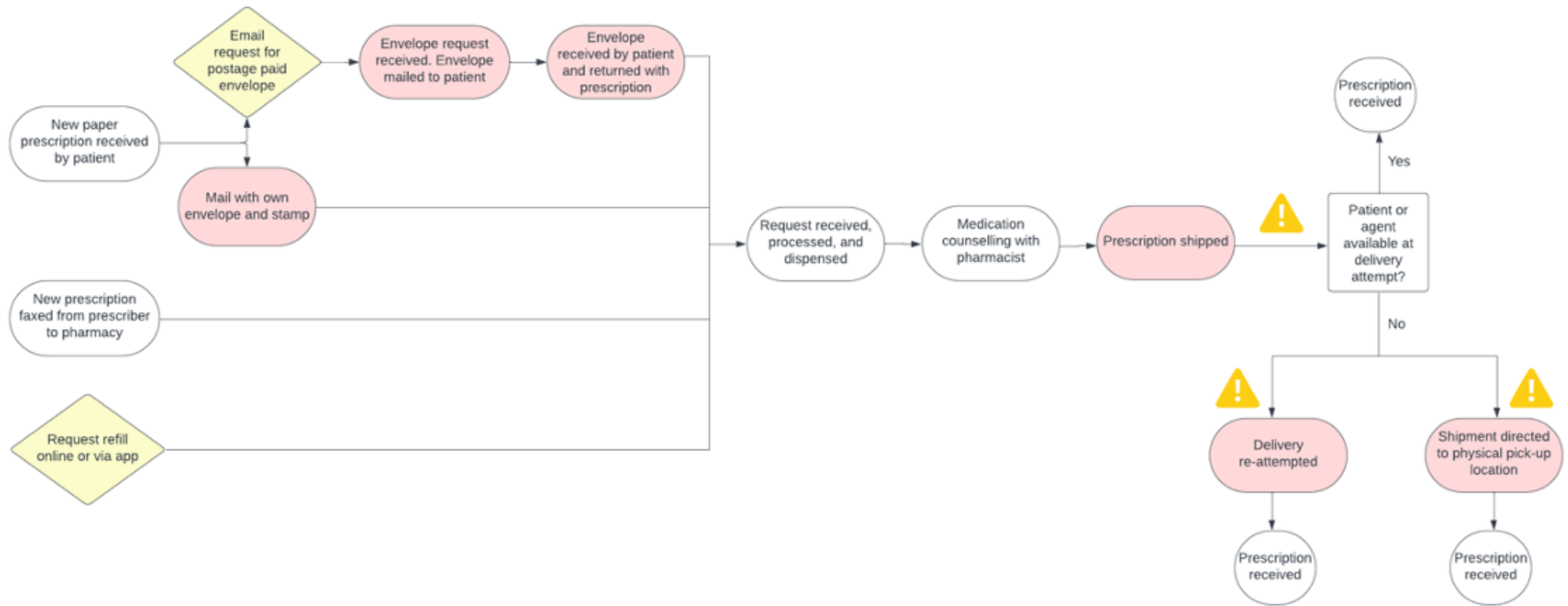
*Access to technology and digital literacy are required to effectively navigate mail-order pharmacy services*

Mail-order pharmacies primarily operate online and require access to web-based services.

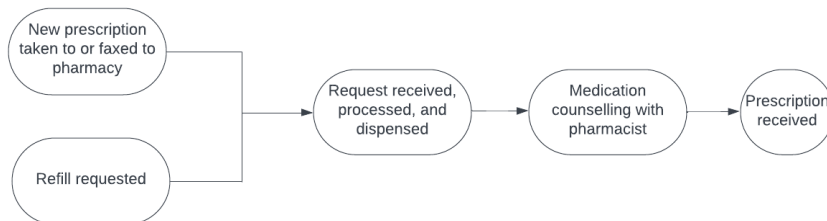
Patients (or their caregivers) generally must therefore have both access to reliable technology and the digital literacy to use available technologies effectively to access care from PPN pharmacies. Some pharmacies may be willing to accommodate phone, fax, and/or mail correspondence as required, though the process for doing so may be complex and difficult to navigate for patients and their caregivers. These barriers may be especially pronounced for those with cognitive challenges or complex medication needs.

Examples of the patient journey in receiving medications from a mail-order versus a local community pharmacy are provided below. Steps indicated by yellow diamonds require the use of technology, steps indicated by red ovals involve delays of varying length to accommodate shipping, and caution symbols indicate opportunities for improper storage and handling during transport.

Patient pathways in navigating prescription dispensing with a mail-order pharmacy:



Patient pathways in navigating prescription dispensing with a bricks-and-mortar community pharmacy:



#### **4. With limited financial resources, patients may need to choose between their preferred provider and their ability to be adherent to their medication**

Medication adherence is complex and influenced by many factors: demographic, family/cultural, psychosocial, disease- and treatment-related, and health system. A patient's relationship with their healthcare provider is among the most powerful tool for navigating the complexity of medication therapy. Evidence shows that an established, trusting, and supportive relationship between patient and pharmacist increases adherence.<sup>36</sup>

The aim of PPNs is to 'channel' patients to in-network pharmacies by providing greater (or sometimes the only) coverage of pharmaceutical products at select pharmacies, thereby allowing the payer to benefit from economies of scale and reduce costs. Patients impacted may face the dilemma of choosing whether to leave the pharmacy/pharmacist they have an established relationship with to obtain coverage of their medically necessary drug products, or to maintain the patient-pharmacist relationship outside of the PPN and pay a higher amount out-of-pocket. This 'choice' can be illusory when clinically necessary medications would cost the patient thousands of dollars annually outside of a PPN (e.g., most specialty medications).

When a patient is only able to obtain coverage for their medications within a closed PPN, their ability to remain with their current pharmacy can be extremely limited; especially when the patient does not have a high disposable income and must make financial tradeoffs to accommodate this decision. In such cases, patients using high-cost medications and/or patients

with limited income often have no feasible choice but to obtain their medications from the PPN pharmacy to benefit from full or partial coverage. The loss of support from a long-term and trusted pharmacist can also negatively impact adherence and patient outcomes.

When they are unable to navigate the PPN system, or when they might prefer to maintain their relationship with their community pharmacist, patients attempt to lower costs by lowering medication consumption. This has been observed even in cases where medications are clinically necessary to manage acute issues or to slow the progression of chronic disease. This can take the form of intentional primary non-adherence (not starting a prescribed medication), secondary non-adherence (not remaining on the medication for the intended duration or at the intended dose), or requesting prescription of less expensive but also less effective medications. In all cases, reduced adherence can pose significant risks to patient safety and negatively impact health outcomes that come at additional individual-level and societal costs. With chronic diseases, progression that is halted or slowed by medication use can resume if non-adherence or changes to drug therapy are introduced, with such changes being potentially irreversible.

With spending on prescribed drugs in Canada seeing annual increases of 6.4%-7.4% from 2020-2022<sup>37-38</sup> and 40-year high increases seen in the Canadian Consumer Price index in 2022,<sup>39</sup> this dilemma and the downstream consequences of subsequent non-adherence are likely to persist and possibly worsen in the future.

## 5. Fragmentation of patient care

Pharmacists have a duty to verify the safety and appropriateness of drugs and vaccines provided to patients. This includes reconciling patients' medications and conducting clinical checks for appropriateness, efficacy, and interactions. However, their ability to do so is dependent on the quality and comprehensiveness of information available to them. Absent such information, a pharmacist is unable to do his or her job correctly, with potential risks to patient safety.

As discussed in Theme 3, the provision of a prescription product to a patient (i.e., dispensing) is not merely a sales transaction but is a clinical service. It requires a pharmacist's professional judgment and expertise, adds clinical value to patient care, and is associated with an assumption of liability by the pharmacist and pharmacy. Recognizing that the ability of a pharmacist to determine the therapeutic appropriateness of a prescription drug, non-prescription drug, supplement, or vaccine is a function of the quality and comprehensiveness of patient information available to them, Ontario Health advises the public:<sup>40</sup>

***“If you can, have all your prescriptions go to the same pharmacy [emphasis added]. That way, the pharmacist can help detect possible drug interactions, and your medication records (including allergy information) will be in one place.”***

PPNs impact the ability of patients to consolidate their care within one pharmacy and may even necessitate that patients use more than one pharmacy, regardless of their preference or the potential safety implications. Many closed PPN agreements only apply to high-cost specialty medications. In many cases these drugs are dispensed by either specialty pharmacies that do not dispense other drugs, or by pharmacies that may not provide the comprehensive and specialized

care required for optimal use of these drugs. As a result, patients' medication records are split across multiple pharmacies which may include a combination of PPN specialty and other contracted pharmacies for high-cost medications, and their regular community pharmacy for all other medications.

Additional permutations of the PPN model create further barriers to consolidation. For example, PPNs using mail-order pharmacies may include policies to only dispense chronic use medications and policies prohibiting the dispensing of narcotics, controlled drugs, benzodiazepines, or other targeted substances. Patients requiring drugs for acute needs or being treated by drugs belonging to specific drug classes have no choice but to receive care from more than one pharmacy, and to also accept potential barriers discussed above related to technological access and ability and delays and improper storage conditions that may occur as a result of shipment by mail or courier.

When a patient's medication record and health history record is split across multiple pharmacies, pharmacists' ability to determine medication safety and appropriateness may be compromised. Such fragmentation can result in unintended duplicate therapy or discontinuation of therapy, or dosing that does not account for drug interactions – all resulting in potential suboptimal benefit realized from these medications or potential risks to patient safety.

Some patient care services also necessitate or greatly benefit from in-person consultation with a pharmacist, including:

### ***Minor ailment management or the provision of non-prescription drug advice***

Pharmacists in Ontario are currently authorized to assess and prescribe prescription and non-prescription treatments for 19 minor ailments. These include conditions that are usually short-term and include infectious diseases that benefit from early treatment (e.g., oral thrush, bacterial or viral eye infections, cold sores, urinary tract infections, yeast infections) as well as the management of pain associated with musculoskeletal sprains and strains.<sup>41</sup> Given their acuity, these concerns are best addressed at a physical pharmacy to ensure prompt initiation of therapy. It is also beneficial as part of the clinical assessment for the pharmacist to be aware of medications used to manage previous episodes, to assist with selecting the drug most likely to be beneficial to the patient and well tolerated.

### ***Pharmacy services requiring in-person delivery (e.g., vaccinations)***

As with all treatments they dispense, pharmacists have a responsibility to ensure the appropriateness and safety of vaccinations they administer. For example, vaccines containing live weakened microorganisms are contraindicated in those with immune system suppression, which can be caused by medical conditions (e.g., active cancer or HIV) or medications. High-cost specialty drugs that are often a target of closed PPNs are commonly immunosuppressing.

Awareness of the use of these medications is therefore extremely important to the vaccinating pharmacist, not only because they make the receipt of live vaccines unsafe, but also because they are used by individuals whose medical condition may place them at elevated risk of other vaccine-preventable diseases. For example, people with autoimmune conditions should be

assessed for vaccination status against pneumococcal disease,<sup>42</sup> people on immunosuppressive therapy may require higher doses of hepatitis B and human papillomavirus (HPV) vaccines to achieve optimal protection,<sup>43</sup> and those with HIV may require vaccines against hepatitis B, HPV, pneumococcal disease, *Haemophilus influenzae* type b, meningococcal disease, and others.<sup>43</sup>

A 2021 survey found that 82% of Canadians feel it is somewhat or very important that their chosen immunization site is close to home and 76% feel it is somewhat or very important to be able to access these services by walk-in.<sup>44</sup> As PPN pharmacies may be mail order providers and therefore unable to administer vaccines or physical pharmacies that are not geographically close to the patient, vaccination uptake may be affected due to both physical barriers as well as reduced exposure to promotional material and in-person dialogue with a pharmacist.

### ***Medications with time sensitivity that should be initiated without delay***

As illustrated in Theme 3, mail-order pharmacy processes result in delayed delivery of medication to patients. Delays are variable in their frequency and duration to accommodate shipping requirements. Even when expedited shipping is offered, treatment may need to be initiated in a timelier manner than can be offered, and some vertically integrated mail-order pharmacies have policies against dispensing acute therapies.

Data from the Canadian Institute for Health Information demonstrates that the need for acute and time-sensitive drug therapy is frequent, with 20 of the top 100 drug classes dispensed in



2021 being for antimicrobials and the class of penicillins alone comprising 8.7% of all prescriptions dispensed, impacting over 1.2 million Canadians.<sup>45</sup>

In addition to antimicrobials, other drug classes may also have an acute need for initiation, such as:

- Antihypertensive drugs in the event of dangerously elevated blood pressure,
- Inhaled bronchodilators or oral corticosteroids for exacerbation of asthma or chronic obstructive pulmonary disease,
- Potassium supplementation for hypokalemia,
- Drugs for acute management of arrhythmia, epilepsy, or mental health deterioration, and
- Anticoagulants or antiplatelets for the prevention or treatment of venous thromboembolism.

Many of these drugs are implicated in common and potentially life-threatening drug-drug interactions encountered in primary care, including warfarin, azole antifungals, fluoroquinolone antibiotics, amiodarone, and macrolide antibiotics, among others.<sup>46</sup> If a PPN pharmacy provides only specialty drugs or is a mail-order pharmacy, an out-of-network pharmacy must be used to ensure timely initiation of these therapies, with this pharmacy potentially not having a complete picture of a patient's medication use. As described above, fragmented medication records can result in missed detection of duplicate therapy or drug interactions that may require dose modification or an alternative drug to optimize both safety and effectiveness.

## **Patient recall and available clinical viewers may be inaccurate and should not replace complete medication records maintained by a single pharmacy**

While patients are inevitably involved in providing medical and medication use histories to pharmacists, patient self-report is generally unreliable and cannot be treated as definitive by pharmacists. A systematic review of 22 studies examining the accuracy of medication histories provided at the time of hospital admission found that 27-54% of patients had at least one medication history error, with 11-59% determined to be clinically important with the potential to cause patient discomfort or harm.<sup>47</sup> For this reason, the Institute of Safe Medication Practices Canada defines a “Best Possible Medication History” as one that is created using both discussion with the patient/family and a review of at least one other reliable information source to verify the patient’s medication use, including prescribed and non-prescribed products.<sup>48</sup> In scenarios where PPNs require that certain prescriptions be dispensed by certain pharmacies, these reliable information sources (i.e., dispensing records) are also fragmented and add both practical challenges regarding timely reconciliation of a complete medication history, and opportunities for some of these information sources to be forgotten by patients who must recall all pharmacies where they have received prescriptions in the recent past.

Ontario pharmacies can opt in to one of two provincial clinical viewers, which offer information including medications dispensed, laboratory results, and discharge summaries. However, medication information provided is limited to only publicly funded dispensed drugs (e.g., those dispensed to Ontario Drug Benefit program recipients) and a small number of dispensed drugs that are monitored in the province (e.g., narcotics and controlled substances).<sup>49</sup> Most acute and chronic medications billed to private insurers or paid for fully out-of-pocket are not captured centrally.

If a consistent single pharmacy were to be used to dispense all of a patient's medications, a complete medication record could be maintained at the pharmacy level to facilitate interaction checking and assessing other measures of safety and appropriateness. Such consolidation also benefits other healthcare providers requiring a timely and comprehensive medication history for a patient, including primary care and specialist physicians, emergency medical services personnel, and those providing care in emergency departments and inpatient units. Indeed, Accreditation Canada (an independent, non-governmental, and not-for-profit organization that identifies and assesses health facilities' Required Organizational Practices that are central to ensuring quality and safety)<sup>50</sup> has identified medication reconciliation as a strategic priority to be performed upon each hospital admission and upon transfers in care settings – including back into the community – with community pharmacy engagement a critical component of this process.<sup>51</sup> Consolidated community pharmacy records facilitate this evidence-based recommendation to improve the quality and safety of patient care.

## Interpretation and opinion

Closed PPNs aim to lower payers' costs through agreements with select pharmacies to provide medication dispensing at a lower cost in exchange for the potential to increase dispensing volume through "channeling" plan members to those pharmacies. In some cases, closed PPNs may also include vertically integrated pharmacies also under the ownership of the payer.

Financial benefits may be countered by trade-offs that may negatively impact patient care, as described above, including the following themes and subthemes:

1. **Restriction of choice of pharmacy/pharmacist.**

- Patients highly value their ability to choose care providers, especially those who are older, who identify as female, who have longer travel distance to access care, and who are less highly educated. Choice of pharmacy and pharmacist is heavily influenced by structural and procedural measures including geographic proximity, accessibility, wait times, and the interpersonal characteristics of pharmacy professionals
- Canadians disagree with insurer-driven "channeling" for pharmacy care, with one in ten switching pharmacies due to insurance-related factors

**2. Patients, including those with low financial literacy and greater healthcare needs, may be precluded from rational decision-making in choice of pharmacy provider.**

- Many Canadians lack the literacy to fully understand the complexity of health insurance and preferred provider networks. Coupled with financial pressures and marketing efforts by payers, their ability to make a free and fully informed decision may be impacted

**3. Geographic and technologic accessibility challenges may negatively impact patient access to in-person or mail-order pharmacy services within PPNs.**

- Closed PPNs intentionally reduce options available to patients for pharmacies where they can receive coverage for their prescription drugs. While all Canadians value convenient pharmacy services with reduced travel distance required to access care, this is especially important for residents of rural, remote, or northern communities who already face greater travel distances and fewer local pharmacy options
- Most patients prefer in-person pharmacy care and many have concerns over the safety and effectiveness of mail-order pharmacy services. Both patients and community pharmacists have reported issues with mail-order delivery, including improper storage, deliveries to wrong addresses, and interception by individuals other than the intended recipient. When signatures are required to receive prescription shipments, patients or authorized representatives must be present at the time of delivery or they risk shipment being tried at a later time or being left at a post office or other physical location for pick-up. Delays due to these or to other factors such as inclement weather all create opportunities for improper storage that can impact product integrity

- Navigating mail-order pharmacy services generally requires access to and proficiency with using the internet, disadvantaging those without such access or ability and who therefore prefer in-person pharmacy services

**4. Implications of PPNs on out-of-pocket payments may force patients to choose between their preferred pharmacy care provider and being able to take medications as prescribed.**

- One of the most influential factors supporting medication adherence is an established, trusting, and supportive relationship between patients and their care providers. When this trusted care provider is not within a closed PPN, patients may face the choice between maintaining this relationship and being able to take their medication as prescribed
- Despite having this ‘choice’ on paper, when clinically necessary medications would cost the patient thousands of dollars annually out-of-pocket if received outside of the PPN, many feel they have no option but to switch providers
- Recent increases to both drug costs and inflation have further impacted this dilemma, which is expected to be an ongoing issue in the future if drug cost trends persist

**5. Fragmentation of care across multiple providers can have detrimental effects on patient safety.**

- Ontario Health recommends that patients use a single and consistent pharmacy to best equip pharmacists to detect and address medication-related problems; yet, directing of only certain drugs to PPN pharmacies or policies limiting mail-order pharmacies from

dispensing all prescriptions essentially force many patients to have medication records stored at more than one pharmacy

- Incomplete medication records at the time of assessing the safety and clinical appropriateness of a prescription can lead to unintended duplicate therapy or discontinuation of drug therapy, or the inability to detect and manage drug interactions
- Current clinical viewers available to pharmacists in Ontario do not contain complete medication dispensing records for all residents and all drug classes. The best strategy to support safe dispensing as well as accurate medication history provision to other health professionals is through a consolidated record at a single pharmacy

While some plan members may have their needs met through closed PPN providers, some will not, and those individuals may also lack awareness of their options or do not have feasible or actionable alternatives when it comes to where they receive clinical pharmacy services, especially for high-cost specialty drugs that they cannot afford without coverage.

**The dispensing of medications is a clinical service performed by a healthcare professional and it has safety implications that go beyond being simply a product-based transaction.** Given the complexity of healthcare decision-making and the potential risks from suboptimal care, patients should be able to choose the provider that best meets their specific needs, including accessibility and trust, with the aim of improving health outcomes and preventing harm. Left unregulated, the channeling of patients by insurers risks limiting patient choice even when their well-being can be or has been negatively impacted by this channeling – a difficult position that the public should be protected from having to face.

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# Curriculum Vitae

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#### BOOK/ENCYCLOPEDIA CHAPTERS:

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#### RESEARCH PRESENTATIONS (presenter(s) underlined, asterisk indicates trainee):

1. Vernon-Wilson E, Waite N, **Houle S**. Pharmacists' perspectives of early-stage implementation of a novel adult life-course vaccine review service (VaxCheck) in community pharmacy. 82<sup>nd</sup> FIP World Congress of Pharmacy and Pharmaceutical Sciences 2024 [Accepted, Poster], Cape Town, South Africa, September 2024.
2. \*DeMarco M, **Houle SKD**, Waite NM. Increasing vaccination service capacity by use of injection-certified pharmacy technicians: A qualitative analysis of best practices. 22<sup>nd</sup> International Social Pharmacy Workshop [Accepted, Oral], Banff, AB, July 2024.
3. Pereira J, Toppari K, **Houle SKD**, Waite NM. Willingness of Canadian community pharmacists to adopt a proactive life-course vaccination practice: a qualitative study. Public Health 2024 [Oral], Halifax NS, April 2024.
4. Syed A, **Houle SKD**, Waite NM. Associations between academic performance in a PharmD program using a co-operative education model and practice readiness milestones. OPEN Summit [Poster], Toronto ON, October 2023.

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6. **Houle SKD**, Yang M, Vernon-Wilson E, Dolovich L, **Waite NM**. VaxCheck: The development and testing of a clinical decision-making adult vaccine tool for community pharmacists. 81<sup>st</sup> FIP World Congress of Pharmacy and Pharmaceutical Sciences [Poster], Brisbane, Australia, September 2023. 17th Vaccine Congress [Poster], Glasgow, Scotland, September 2023.
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8. **\*Syed A**, Huang Y, Goh J, Moroz S, Pugsley J, Waite NM, **Houle SKD**. Associations between academic performance in a PharmD program using a co-operative education model and practice readiness milestones. AFPC Canadian Pharmacy Education and Research Conference [Poster], Winnipeg, MB, June 2023.
9. **Houle SKD**. Ayahuasca and travellers: Use and abuse. 18<sup>th</sup> Conference of the International Society of Travel Medicine [Oral], Basel, Switzerland, May 2023.
10. **DeMarco M\***, Waite N, **Houle S**. A shot in the arm: The evidence and gaps regarding the role of pharmacy technicians in vaccination services. Canadian Immunization Research Network Annual Meeting [Oral], Canadian Immunization Conference [Oral], Ottawa ON, April 2023.
11. **Nair D**, Green J, **Houle SKD**, Marra C. Pharmacy students' role expectations in practice: A comparison between NZ and Canada. Australasian Pharmaceutical Science Association conference [Poster], Perth, Australia, November 2022.
12. **Alsabbagh MW**, Pan S, Wieland M, Waite N, **Houle S**, Grindrod K. The Accessibility of Pharmacies that Offer COVID-19 Vaccines Among Vulnerable Populations in Ontario. Canadian Association of Population Therapeutics [Poster], Toronto ON, October 2022.
13. DeMarco M, Carter C, **Houle SKD**, **Waite NM**. A shot in the arm: The evidence and gaps regarding the role of pharmacy technicians in vaccination services. FIP World Congress of Pharmacy and Pharmaceutical Sciences [Poster], Seville, Spain, September 2022.
14. **Waite N**, Houle S, Timony P, Gauthier A. Identifying vaccination deserts: The availability and distribution of pharmacists with authorization to administer injections in Ontario Canada. International Social Pharmacy Workshop [Oral], Chicago IL, July 2022.
15. **Fernandes H**, Richard C, Bynkoski K, Ewan B, **Houle S**. Check-In: What resonated with students? Canadian Pharmacy Education and Research Conference [Oral], St. John's NL, June 2022.
16. Timony P, Waite N, **Houle S**, Violette R, Gauthier A. Le Pharmacien est disponible... (The Pharmacist is in): The availability and distribution of French-speaking pharmacists in Ontario. Canadian Pharmacists Association [Poster], Ottawa ON, June 2022.
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18. **Alsalemi N**, Sadowski CA, Elftouh N, Kilpatrick K, **Houle S**, Lafrance JP. Exploring the facilitators and barriers toward the use of clinical decision-support tools by healthcare providers. Together: Canada's Hospital Pharmacy Conference 2022 [Poster], virtual, January 2022.



19. \*DeMarco M, **Houle S**, Waite N. A The Role of Pharmacy Technicians in Vaccination Programs: A Scoping Review. International Pharmaceutical Federation Pharmacy Practice Research Virtual Summer Meeting [Oral], virtual, June 2021.
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22. Pereira JA, Waite N, Andrew M, Gilca V, **Houle S**. Impact of influenza and influenza-like illness on Canadian adults aged 50-64 years during the 2018/19 and 2019/20 seasons. Canadian Immunization Conference [Poster], virtual, December 2020.
23. Andrew M, Waite N, Pereira JA, Gilca V, **Houle S**. Impact of influenza and influenza-like illness on Canadian adults aged 65 years and older during the 2018/19 and 2019/20 seasons. Canadian Immunization Conference [Poster], virtual, December 2020.
24. Waite N, Andrew M, Gilca V, **Houle S**, Pereira JA. Impact of COVID-19 on Canadian older adults' willingness to be vaccinated against influenza during the 2019/2020 season. Canadian Immunization Conference [Poster], virtual, December 2020.
25. Fernandes HVJ, Richard C, Bynkoski K, Ewan B, **Houle SKD**. Check-In: An educational activity to address well-being and burnout among pharmacy students. University of Waterloo Virtual Conference on Student Mental Health Research [Poster], virtual, November 2020.
26. Nagge J, **Houle S**, Chan E, Foong EA, Stypa K, McKee R. Choice of anticoagulation therapy and persistence among patients with atrial fibrillation following a shared decision-making encounter. Thrombosis and Hemostasis Summit of North America [Oral], virtual, October 2020.
27. \*Foong A, **Houle S**, Grindrod K. Regulation of health professions in four developed countries. 2019 Annual Meeting of the North American Primary Care Research Group (NAPCRG) [Poster], Toronto, ON, November 2019.
28. Alsabbagh MW, **Houle SKD**. Spatial patterns of emergency department visits that can be managed by pharmacists within expanded scope in Ontario. 2019 Annual Meeting of the North American Primary Care Research Group (NAPCRG) [Poster], Toronto, ON, November 2019.
29. **Houle S**. Scope of practice for pharmacists in Canada related to the provision of pre-travel care. The 16<sup>th</sup> Conference of the International Society of Travel Medicine [Poster], Washington, DC. June 2019.
30. Chaudhry M, Waite NM, **Houle SKD**, Kwong J, Zhou L, Cadarette SM. Community pharmacy influenza immunization services in Ontario: The OPEN Atlas. Ontario Pharmacy Evidence Network (OPEN) Summit [Poster], Toronto ON, March 2019.
31. \*Fernandes H, **Houle S**. Development and Testing of a Framework for the Assessment of Health-Related Risks Among Travellers by Pharmacists in Ontario. Ontario Pharmacy Evidence Network (OPEN) Summit [Poster], Toronto ON, March 2019. The 16<sup>th</sup> Conference of the International Society of Travel Medicine [Poster], Washington DC, June 2019.
32. **Houle S**, \*Kozlovsky K, \*Fernandes H, Rosenberg-Yunger Z. Uptake of travel health services by community pharmacies and patients following pharmacist immunization scope expansion in Ontario, Canada. Ontario Pharmacy Evidence Network (OPEN) Summit [Oral], Toronto ON, March 2019. Pharmacy Experience Pharmacie (PxP): Canadian Pharmacists Association [Poster], Toronto, ON. June 2019.
33. **Houle SKD**, Cook BD, \*Fernandes HVJ. How are we preparing new pharmacists for a role as travel health care providers? A curricular environmental scan of travel medicine training at

schools and faculties of pharmacy in Canada. Ontario Pharmacy Evidence Network (OPEN) Summit [Poster], Toronto ON, March 2019.

34. **Houle SKD**, Eurich DT. Completion of multiple-dose travel vaccine series and the availability of pharmacist immunizers: A retrospective analysis of administrative data in Alberta, Canada. Ontario Pharmacy Evidence Network (OPEN) Summit [Poster], Toronto ON, March 2019. The 16<sup>th</sup> Conference of the International Society of Travel Medicine [Poster], Washington, DC. June 2019. Pharmacy Experience Pharmacie (PxP): Canadian Pharmacists Association [Poster], Toronto, ON. June 2019.
35. **Dolovich L**, Austin Z, Waite N, Chang F, Farrell B, Grindrod K, **Houle S**, McCarthy L, MacCallum L, Sproule B. Pharmacy in the 21st century: Enhancing the impact of the profession of pharmacy on people's lives in the context of health care trends, evidence and policies. University of Toronto Centre for Practice Excellence Speaker Series. Toronto, Ontario, February 2019.
36. **\*Pullagura GR**, Waite NM, Violette R, **Houle SKD**. Addressing influenza vaccine hesitancy in Ontario community pharmacies: Identifying targets for action using behaviour change framework. Canadian Immunization Conference [Oral], Ottawa, Ontario, December 2018.
37. **Marra CA**, **Houle S**, Green J. Are entry year pharmacy students created equally? A comparison between New Zealand and Canada. Australasian Pharmaceutical Science Association Annual Conference [Oral], Adelaide, Australia, December 2018.
38. **Waite NM**, Violette R, **Houle SKD**, Nissen L. *Giving a "shot in the arm" to global pharmacists-as-immunizers research*. International Federation for Pharmacy, 78<sup>th</sup> FIP World Congress of Pharmacy and Pharmaceutical Science [Poster], Glasgow, Scotland, September 2018.
39. **Alsabbagh MW**, **Houle SKD**. *Estimating the proportion of emergency department visits that can be managed by pharmacists' expanding scope in Ontario between 2010 and 2017*. Trillium Primary Health Care Research Day [Oral], Toronto ON, June 2018 (presented by Alsabbagh). Canadian Society of Hospital Pharmacists Professional Practice Conference [Poster], Toronto ON, February 2019 (presented by Alsabbagh). Ontario Pharmacy Evidence Network (OPEN) Summit [Poster], Toronto ON, March 2019 (presented by Houle).
40. **\*Kozlovsky K**, Rosenberg-Yunger Z, **Houle SKD**. *Community Pharmacy-Based Travel Health Services: Current Landscape and Perceptions in Ontario*. Ontario Pharmacists Association Conference 2018 [Oral], Huntsville ON, June 2018.
  - Winner: Best Student 3-Minute Research Presentation
41. **\*Pullagura GR**, Violette R, **Houle SKD**, Waite N. Shades of gray in vaccination decisions – Understanding Ontario community pharmacists' perspectives of and experiences with seasonal influenza vaccine hesitancy. Canadian Pharmacists Conference [e-Poster], Fredericton NB, June 2018.
  - Winner: Best Pharmacy Practice Research Facilitated e-Poster Presentation
42. **Alsabbagh MW**, **Houle SKD**, Waite NM. *The availability of pharmacists with additional prescribing authorization in Alberta in relation to vulnerable populations' distribution: A cross-sectional study*. Canadian Pharmacists Conference [Poster], Fredericton NB, June 2018.
43. **Carter CA**, **Houle SKD**. *Librarian as course collaborator: An embedded model of information literacy instruction for first-year pharmacy students*. Canadian Health Libraries Association [Poster], St. John's NL, June 2018.
44. **Alsabbagh MW**, **Houle SKD**. *Estimating the proportion of emergency department visits that can be managed by pharmacists' expanding scope in Ontario between 2010 and 2017*. DSECT Seminar Series. April 2018.

45. \*Pullagura GR, Waite NM, **Houle SKD**, Wong WWL. *Economic analysis of introducing community pharmacist led influenza vaccine consultation service for Ontario seniors*. Pharmacy Research Day 2018, University of Waterloo School of Pharmacy [Oral], Kitchener ON, April 2018.
46. Nagge J, **Houle S**, Killeen RM, Richard CL, Lippens M. *How important is the experiential component? A blended learning course for prospective anticoagulation providers*. University of Waterloo Teaching and Learning Conference 2018 [Poster], Waterloo ON, April 2018.
47. Nagge J, **Houle S**, Killeen RM, Richard C, Lippens M. *A blended learning course for prospective anticoagulation providers: evaluation and insights*. International Pharmaceutical Federation World Congress [Poster], Glasgow, Scotland, September 2018.
48. **Houle SKD**, Meyer SB, Austin Z. *How do structural and financial factors influence professionals' decision-making, and how might this affect patient- or client-centered service delivery?* North American Primary Care Research Group Annual Meeting [Workshop], Montreal QC, November 2017.
49. \*Foong A, Edwards D, **Houle SKD**, Grindrod KA. *Ready or not? Pharmacist perceptions of a changing scope of practice before it happens*. Waterloo Wellington Clinical Research and Quality Improvement Symposium [Oral], Kitchener ON, June 2017. Canadian Pharmacists Conference [Oral], Quebec City QC, June 2017. Ontario Pharmacists Association Conference [Poster], London ON, June 2017.
  - Winner: Waterloo Wellington Clinical Research and Quality Improvement Symposium Best Presentation (tie)
  - Winner: Canadian Pharmacists Conference Best Pharmacy Practice Research Oral Presentation
  - Winner: Ontario Pharmacist Association (OPA) Conference Best Poster Presentation and Best Audio-Slide Presentation
50. \*Foong A, Grindrod KA, **Houle SKD**. *Will I lose my license for that? A closer look at disciplinary hearings and what it means for pharmacists' expanded scope*. International Pharmaceutical Federation World Congress [Oral], Glasgow, Scotland, September 2018. Canadian Pharmacists Conference [Oral], Fredericton NB, June 2018. Waterloo Wellington Clinical Research and Quality Improvement Symposium 2018 [Oral], Kitchener ON, May 2018. Waterloo Wellington Clinical Research and Quality Improvement Symposium 2017 [Poster], Kitchener ON, June 2017. Ontario Pharmacists Association Conference [Poster], London ON, June 2017. Presented: Ontario Pharmacy Evidence Network (OPEN) summit [Oral], Toronto ON, October 2017.
51. **Houle SKD**, MacKeigan L. *Home care pharmacy practice in Canada: A cross-sectional survey of services provided, remuneration, barriers, and facilitators*. Canadian Pharmacists Conference [Poster], Quebec City QC, June 2017.
52. **Houle SKD**, Bascom C, Rosenthal MM. *Determining the clinical effectiveness and patient satisfaction of a pharmacist-managed travel medicine clinic under an expanded scope of practice*. Canadian Pharmacists Conference [Oral], Quebec City QC, June 2017. International Pharmaceutical Federation (FIP) World Congress 2017 [Oral], Seoul, South Korea, September 2017.
53. Violette R, Waite N, Papastergiou J, **Houle SKD**, Pearson-Sharpe J, Milne E. *Distribution of influenza vaccine to community pharmacies in Ontario: the 2015-16 flu season experience*. Canadian Pharmacists Conference [Poster], Quebec City QC, June 2017. Ontario Pharmacy Evidence Network (OPEN) summit [Poster], Toronto ON, October 2017.
54. \*Pullagura GR, Waite N, Violette R, **Houle SKD**. *Assessment of practicing community pharmacists' knowledge, attitudes and behaviour towards influenza vaccine hesitancy in*

*Ontario – An exploratory study.* Waterloo Wellington Clinical Research and Quality Improvement Symposium [Oral], Kitchener ON, June 2017. Canadian Pharmacists Conference [Poster], Quebec City QC, June 2017. Ontario Pharmacy Evidence Network (OPEN) summit [Poster], Toronto ON, October 2017.

55. **Houle SKD**, O'Reilly D, Blackhouse G, Burns S, Bowen J, Burke N, Mehlretter J, Waite N. *Economic analysis of community pharmacists providing influenza vaccination in Ontario.* North American Primary Care Research Group Annual Meeting [Poster], Montreal QC, November 2017. Canadian Pharmacists Conference [Poster], Quebec City QC, June 2017. Ontario Pharmacy Evidence Network (OPEN) showcase [Oral], Waterloo ON, October 2016.
56. O'Reilly D, Blackhouse G, Burns S, Bowen J, Burke N, Mehlretter J, Waite N, **Houle S**. *Economic analysis of community pharmacists providing influenza vaccination in Ontario.* Canadian Immunization Conference [Oral], Ottawa ON, December 2016. Canadian Agency for Drugs and Technologies in Health [Oral], Ottawa ON, April 2017, Ontario Pharmacy Evidence Network (OPEN) showcase [Oral], Waterloo ON, October 2016.
57. **Houle S**, Yang J. *Stakeholder perspectives on economic analyses of billable pharmacy services in Ontario.* Canadian Pharmacists Association [Poster], Calgary AB, June 2016.
58. **Houle S**. *The Provision of Home Care by Pharmacists: Determining Current Practice in Canada.* University of Waterloo Network for Aging Research 2015 Fall Symposium on Aging Research [Oral], Waterloo ON, October 2015.
59. Kwong J, Cadarette S, Schneider E, Campitelli M, Church D, Consiglio G, Pojskic N, **Houle S**, Alsabbagh W, **Waite N**. *Community pharmacies providing influenza vaccines in Ontario: A descriptive analysis using administrative data.* Canadian Pharmacists Association [Oral], Ottawa ON, May 2015.
  - Winner: Best Pharmacy Practice Research Oral Presentation
60. **Kwong J**, Cadarette S, Schneider E, Campitelli M, Church D, Consiglio G, Pojskic N, Alsabbagh W, **Houle S**, Waite N. *Community pharmacies providing influenza vaccines in Ontario: A descriptive analysis using administrative data.* The Ontario Public Health Convention [Oral], Toronto ON, March 2015. Canadian Immunization Research Network Annual General Meeting [Oral], Montreal QC, May 2015.
61. Ziegler B, Alsabbagh W, **Houle SKD**, Wenger L, Waite N. *Understanding Ontario pharmacists' personal influenza vaccination rates.* Canadian Pharmacists Association [Oral], Ottawa ON, May 2015.
62. **Houle SKD**, Charrois TL, Faruquee CF, Tsuyuki RT, **Rosenthal MM**. *A randomized controlled knowledge translation intervention in Alberta community pharmacies using the PARIHS framework.* Canadian Pharmacists Association [Oral], Ottawa ON, May 2015.
63. **Waite NM**, Church D, Johnson S, Raman-Wilms L, Pojskic N, Pearson Sharpe J, Schneider E, **Houle SKD**. *Pharmacists' expanded immunization authority: A regulatory review.* Canadian Immunization Research Network conference [Poster], Montreal QC, May 2015.
64. **Church D**, Johnson S, Raman-Wilms L, Pojskic N, Schneider E, **Houle S**, Waite NM. *Pharmacists' Expanded Immunization Authority: A Global Regulatory Review.* Canadian Immunization Conference [Poster], Ottawa ON, December 2014. Canadian Association for Population Therapeutics [Poster], Toronto ON, November 2014.
65. **Houle SKD**, Grindrod KA, Chatterley T, Tsuyuki RT. *Paying Pharmacists for Patient Care: A Systematic Review of Remunerated Pharmacy Clinical Care Services.* American Society of Consultant Pharmacists Annual Meeting & Exhibition [Poster], Orlando FL, November 2014.
66. **Church D**, Johnson S, Pojskic N, Raman-Wilms L, Schneider E, **Houle S**, Waite NM. *Pharmacist and Pharmacy Student Immunization Authority: A Jurisdictional Review.* Ontario Pharmacy

- Research Collaboration (OPEN) Summit [Poster], Toronto ON, October 2014.
67. Johnson S, Church D, Raman-Wilms L, Waite N, Pearson Sharpe J, **Houle S**, Schneider E. *Pharmacy Students as Immunizers: A Scoping Review of the Literature*. Ontario Pharmacy Research Collaboration (OPEN) Summit [Oral], Toronto ON, October 2014.
  68. Kwong J, Cadarette S, Schneider E, Campitelli M, Church D, Consiglio G, Pojskic N, **Houle S**, Waite N. *Impact of Pharmacists on Influenza Vaccination Uptake in Ontario: A Descriptive Analysis using Administrative Claims Data*. Ontario Pharmacy Research Collaboration (OPEN) Summit [Oral], Toronto ON, October 2014; The Ontario Public Health Convention [Oral], Toronto ON, March 2015.
  69. Church D, Pojskic N, Schneider E, **Houle S**, Waite N. *Pharmacist Immunization Authority beyond Influenza: A Scoping Review*. Ontario Pharmacy Research Collaboration (OPEN) Summit [Oral], Toronto ON, October 2014.
  70. Tsuyuki RT, **Houle SKD**, Charrois TL, Kolber MR, McAlister FA, Rosenthal MM, Lewanczuk R, Cooney D. *A randomized trial of the effect of pharmacist prescribing on improving blood pressure in the community: The Alberta Clinical Trial in Optimizing Hypertension (RxACTION)*. Canadian Cardiovascular Congress [Oral], Vancouver BC, October 2014 (Tsuyuki); Canadian Hypertension Congress [Oral], Gatineau QC, October 2014 (Tsuyuki); Canadian Pharmacists Association [Oral], Saskatoon SK, June 2014 (Houle); University of Alberta Department of Medicine Research Day [Poster], Edmonton AB, May 2014 (Tsuyuki); Canadian Association for Health Services and Policy Research conference [Poster], Toronto ON, May 2014 (Houle).
  71. **Houle SKD**, Tsuyuki RT, Charrois TL, Kolber MR, McAlister FA, Rosenthal MM, Lewanczuk R, Cooney D. *Pay-for-performance remuneration for pharmacist prescribers' management of hypertension: A pre-specified sub-study of the Alberta Clinical Trial in Optimizing Hypertension (RxACTION)*. Canadian Pharmacists Association [Poster], Saskatoon SK, June 2014.
  72. **Houle SKD**, Grindrod KA, Chatterley T, Tsuyuki RT. *Paying Pharmacists for Patient Care: A Systematic Review of Remunerated Pharmacy Clinical Care Services*. Canadian Pharmacists Association [Poster], Saskatoon SK, June 2014.
  73. **Houle SKD**, Al Hamarneh YN, Tsuyuki RT. *The Validity of Home Blood Pressure Monitor Validation Studies*. Canadian Pharmacists Association [Poster], Saskatoon SK, June 2014; Canadian Hypertension Congress [Poster], Montreal QC, October 2013.
  74. Rosenthal MM, **Houle SKD**. *Barriers to Pharmacy Practice Change; a Narrative Review (from Practice Barriers to Practice Implementation)*. International Social Pharmacy Workshop [Poster], Boston MA, August 2014.
  75. Rosenthal MM, **Houle SKD**, Tsuyuki RT. *Beyond Dispensing – A clinical facilitation role for Pharmacy technicians?* Canadian Pharmacists Association [Poster], Charlottetown PEI, June 2013.
  76. **Houle SKD**, Grindrod KA, Tsuyuki RT. *A Systematic Review of Remuneration for Pharmacist-Provided Injections and Immunizations*. Canadian Pharmacists Association [Poster], Charlottetown PEI, June 2013.
  77. Al Hamarneh YN, **Houle SKD**, Tsuyuki RT. *The Validity of Blood Pressure (BP) Kiosk Validation Studies: A Systematic Review*. Canadian Pharmacists Association [Poster], Charlottetown PEI, June 2013; Canadian Hypertension Congress [Poster], Toronto ON, October 2012.
  78. **Houle SKD**, Tsuyuki RT. *Opportunities to Improve Hypertension Care in the Community: An Analysis of Over 8 Million Pharmacy-Based Blood Pressure Kiosk Readings*. 24<sup>th</sup> Scientific Meeting of the International Society of Hypertension [Oral], Sydney, Australia, October 2, 2012; Canadian Institutes of Health Research - Institute of Circulatory and Respiratory Health Young Investigators Forum [Poster], Montreal QC, June 2012; Canadian Pharmacists Association,



Whistler BC, June 2012; Canadian Hypertension Congress, Alliston ON, October 2011 (award recipient).

79. Tsuyuki RT, Charrois TL, **Houle SKD**, McAlister FA, Kolber M, Cooney D, Lewanczuk RZ, Campbell NRC. *Improving Hypertension Care and Outcomes Through the Use of Community Pharmacists With Prescriptive Authority - The RxACTION Study - A randomized trial design*. 24th Scientific Meeting of the International Society of Hypertension [Oral], Sydney, Australia, October 2, 2012; Faculty of Pharmacy and Pharmaceutical Sciences Research Day [Poster], Edmonton AB. November 2009.
80. **Houle S**, Chuck A, Tsuyuki R. *BP Kiosks for Medication Therapy Management: The Business and Care Opportunities for Pharmacists*. Canadian Pharmacists Association [Poster], Whistler BC, June 2012.
81. **Houle S**, Jackevicius C, McAlister F, Chuck A, Tsuyuki R. *The effect of performance-based remuneration on clinical, economic and quality outcomes in health care*. Canadian Pharmacists Association [Poster], Montreal QC, May 2011; Department of Medicine Research Day [Poster], University of Alberta, May 2011.
82. **Houle S**, Chuck A, McAlister F, Tsuyuki R. *The Impact of Community Pharmacy Management of Hypertension on Health System Costs*. Canadian Agency for Drugs and Technologies in Health 2011 Symposium [Poster], Vancouver BC, April 2011; Canadian Cardiovascular Congress [Oral], Montreal QC, October 2010; Canadian Pharmacists Association [Poster], Calgary, AB, May 2010; Department of Medicine Research Day [Poster], University of Alberta, May 2010; Cardiac Sciences Research Day [Poster], University of Alberta, June 2010.
83. Wynnyk K, Gordash J, Hanson S, Kuzyk D, **Houle S**, Timinski C, Tung T, Vanderburgh N. *Caring Collaborators: Nurse Practitioners and Pharmacists in Home Living and Supportive Living Practice Settings*. "Strengthening the Bond – Culture, Collaboration and Change" Tri-Professional Conference [Poster], Banff AB. May 2009.
84. **Houle S**, Alleyne A, Morris SA. *Myocardial Infarction During IVIG Infusion Therapy after Previous IVIG-Related Venous Thromboembolism*. Canadian Society of Hospital Pharmacists Banff Conference [Poster], March 2007.

#### INVITED PRESENTATIONS:

1. *SoTL 101: Scholarship of Teaching and Learning*. Association of Faculties of Pharmacy of Canada webinar [virtual]. March 2024.
2. *Protection Beyond Flu: What's New for Influenza Vaccines Among Adults 50+*. Canadian Immunization Conference 2021 [virtual]. December 2021.
3. *Acceptance, 'Anti-Vaxx', and Everything in Between: Vaccine Hesitancy in Pharmacy Practice*. Ontario Pharmacists Association 2021 Virtual Conference [virtual]. June 2021.
4. *Continuous Quality Improvement and Practice Facilitation in Pharmacy Practice*. Research in Social and Administrative Pharmacy webinar. May 2021.
5. *Helping Unlock Better Care (HUB|C) using quality improvement science in community pharmacies – An implementation method*. International Pharmaceutical Federation Pharmacy Practice Research Showcase [webinar]. Nov. 2020.
6. *Acceptance, 'Anti-Vaxx', and Everything in Between: Vaccine Hesitancy in Pharmacy Practice*. Pharmacists Association of Newfoundland and Labrador 2020 PANL Virtual Conference [webinar]. Sept. 2020.
7. *Does compromised mean contraindicated? Vaccination of patients with altered immune status*. Canadian Society of Hospital Pharmacists [webinar]. Sept. 2020.

8. *From 'Eh' to Zika: The scope of practice and evidence related to Canadian pharmacists as travel health care providers.* 16<sup>th</sup> Conference of the International Society of Travel Medicine, Washington DC, USA, June 2019.
9. *Evidence and opportunities for pharmacists as travel health care providers.* University of Toronto Centre for Practice Excellence rounds, Toronto ON, May 2019.
10. *Improving Access to Travel Vaccines: The Pharmacist's Role.* Canadian Immunization Conference, Ottawa ON, December 2018.
11. *Pay for performance metrics: Canadian evidence and international experiences.* Canadian Pharmacists Conference, Fredericton NB, June 2018.
12. *Pay for performance* panelist. Meeting of the Canadian Pharmacists Association board of directors, Executive Directors of the provincial pharmacy associations, and the chairs of provincial pharmacy association boards. Fredericton NB. June 2018.
13. *Travel Health: The next destination for pharmacy?* Canadian Foundation for Pharmacy Innovation Showcase. Toronto ON. April 2018.
14. *Canadian evidence on pay-for-performance in pharmacy – The RxACTION Trial.* Canadian Pharmacists Association Pay-for-Performance Working Group meeting. Ottawa ON. March 2018.
15. *Pharmacist-managed travel health clinics under an expanded scope: Evidence of clinical effectiveness and patient satisfaction from Alberta.* Canadian Pharmacy Practice Research Group Webinar Series. October 2017.
16. *Students Helping Students: Intra-Professional Collaboration across Pharmacy Schools Through Video-Conferencing.* Canadian Conference on Pharmaceutical Education and Research. Quebec City QC. June 2017.
17. *From Guidelines to Pharmacy Practice: A Review and Case-Based Approach for the Care of Patients with Hypertension.* Canadian Pharmacists Conference 2017. Quebec City QC. June 2017.
18. *The Alberta Clinical Trial in Optimizing Hypertension (RxACTION) and the Role of the Pharmacist in Hypertension Care.* Renal Pharmacy Rounds, Grand River Hospital. Waterloo ON. September 2015.
19. *The Alberta Clinical Trial in Optimizing Hypertension (RxACTION) Study – Study Methods and Status.* Canadian Society of Hospital Pharmacists Alberta Branch AGM and Educational Sessions. Edmonton AB. October 2013.
20. *Validity of Blood Pressure Monitoring Devices.* Presented as part of *Hypertension 2012: A Hands-On Workshop* at the Canadian Pharmacists Association Conference 2012. Whistler BC. June 2012.
21. *Alberta Clinical Trial in Optimizing Hypertension (RxACTION) Study.* Interdisciplinary Chronic Disease Collaboration workshop on working with decision-makers. Edmonton AB. March 2012.
22. *Pharmacist Prescribing in Chronic Disease Management – Methods and Status of the Rural RxACTION Study.* Interdisciplinary Chronic Disease Collaboration Research Rounds. Edmonton AB. October 2011.

**EXTERNAL GRANTS:**

<b>Role</b>	<b>Agency</b>	<b>Project Title</b>	<b>Value</b>	<b>Period</b>
Co-Investigator (PI: Ross Tsuyuki)	Alberta Innovates – Health Solutions	<i>A Knowledge Translation Pilot Intervention in Community Pharmacies using the PARIHS Framework</i>	\$9,905	2 years (04/2014 – 03/2016)
Principal Investigator	Neighbourhood Pharmacy Association of Canada	<i>Economic analysis of community pharmacists providing influenza vaccination in Ontario.</i>	\$75,992	1 year (12/2015 – 12/2016)
Principal Investigator	Canadian Foundation for Pharmacy	<i>Determining the clinical effectiveness and patient satisfaction of a pharmacist-managed travel medicine clinic under an expanded scope of practice.</i>	\$17,220	1 year (11/2015 – 11/2016)
Principal Investigator	International Society of Travel Medicine	<i>The Association Between the Proportion of Pharmacists Authorized to Administer Injections and the Proportion of Patients Adherent to Multiple-Dose Travel Vaccine Regimens: A Retrospective Cohort Analysis of Administrative Data in Alberta, Canada</i>	\$13,000	2 years (06/2017 – 06/2019)
Co-Applicant (PI: Nancy Waite)	Merck	<i>Using Micro-learning to Help Pharmacists and Pharmacy Technicians Conduct Productive Vaccine Conversations</i>	\$35,250	6 months (07/2017 – 12/2017)
Co-Investigator (PIs: Jacob Shelley and Leia Minaker)	Canadian Institutes of Health Research – Catalyst Ethics Grant	<i>Selling Health: How do Pharmacists Consider their Ethical Conduct in Relation to Front-of-Store Sales?</i>	\$99,150	2 years (10/2017 – 08/2019)
Co-Investigator (PI: Wasem Alsabbagh)	CSHP Foundation 2017 Research Grant (Canadian Society of Hospital Pharmacists)	<i>Estimating the proportion of emergency department visits that may be managed appropriately by pharmacists within expanded scope of practice</i>	\$13,400	2 years (02/2018 – 02/2020)



Principal Investigator	GSK Medical Education Grant	<i>Pharmacists as immunizers: A special supplement to the Canadian Pharmacists Journal</i>	\$50,000	1.5 years (07/2018 – 12/2019)
Co-Investigator (PI: Natasha Crowcroft)	The Connaught Global Challenge Award, University of Toronto	<i>The benefits of pneumococcal vaccination for seniors: A Centre for Vaccine Preventable Diseases interdisciplinary project on healthy aging and immunization science</i>	\$248,789	2 years (08/2019 – 08/2021)
Collaborator (PI: Sara Guilcher)	CIHR Project Grant	<i>Developing a Patient Reported Outcome on Medication-related Quality of Life (PRO-mQoL) for Persons with Physical Disability. Canadian Institutes of Health Research Project Grant.</i>	\$100,000	1 year (04/2022 – 03/2023)
Principal Investigator	CIHR Catalyst Grant: Quadruple Aim and Equity	<i>VaxCheck: The development and testing of community pharmacy-based vaccination reviews using a continuous quality improvement approach</i>	\$99,510	1 year (03/2022 – 02/2023)
Co-Principal Investigator	Food, Health & Consumer Products of Canada	<i>The impact of drug scheduling on patient behaviour in response to minor ailments.</i>	\$55,000	7 months (05/2022 – 12/2022)
Co-Investigator (PI: Nancy Waite)	Sanofi	<i>Strategies for Improving Vaccine Uptake in Pharmacy</i>	\$78,442.50	1.5 years (12/2022 – 06/2024)
Principal Investigator	Sanofi	<i>VaxCheck: the development and testing of community pharmacy-based vaccination reviews using a continuous quality improvement approach</i>	\$13,228.90	1.5 years (12/2022 – 06/2024)
Co-Investigator (PI: Mina Tadrous)	CIHR Planning & Dissemination Grant	<i>Developing an Ontario community pharmacy based Minor ailment service Evaluation framework (DOME)</i>	\$49,875	1 year (06/2023 – 05/2024)

Principal Investigator	Pfizer Quality Improvement RFP: Optimizing Maternal Immunization Practice in Canada	<i>Immunization in Pregnancy: An Interactive Case-Based Education Program for Pharmacists</i>	\$42,776	1.5 years (09/2023 – 03/2025)
Public Co-Investigator (PI: Cora Constantinescu)	Public Health Agency of Canada Immunization Partnership Fund	Advancing and Applying to Practice the Training Program for Optimized Vaccine Communication	\$110,000	8 months (08/2023 – 04/2024)

#### INTERAL FUNDING:

Role	Agency	Project Title	Value	Period
Principal Investigator	Ontario Pharmacy Research Collaboration (OPEN)	<i>Determining the perspectives of stakeholders on priorities for economic analyses of billable pharmacy services in Ontario (Applied Health Research Question)</i>	\$23,029	3 months (01/2015 – 03/2015)
Principal Investigator	Network for Aging Research, University of Waterloo (Emerging Scholar Mentorship Grant)	<i>The provision of home care by pharmacists: Current practice in Canada</i>	\$10,000	1 year (05/2015 – 04/2016)
Co-Investigator (PI: Nancy Waite)	Ontario Pharmacy Research Collaboration (OPEN)	<i>Influenza vaccine distribution models</i>	\$19,884	3 months (01/2016 – 03/2016)
Co-PI (with Nancy Waite)	University of Waterloo (International Research Partnership Grant), and Queensland University of Technology (matching)	<i>Giving a 'Shot in the Arm' to Global Pharmacists as Immunizers</i>	\$39,109 (\$19,109 from Waterloo, \$20,000 matching from QUT)	1 year (01/2017 – 12/2017)

Co-Investigator (PI: Jeff Nagge)	Learning Innovation and Teaching Enhancement (LITE) Grant, University of Waterloo	<i>Measuring the value of including experiential opportunities as part of a blended learning continuing professional development program for prospective providers of anticoagulation.</i>	\$5,000	1 year (07/2017 – 06/2018)
Principal Investigator	Ontario Pharmacy Research Collaboration (OPEN)	<i>Community Pharmacy-based Travel Medicine Services: Current Landscape and Perceptions of Implementation Following Expansion of Scope in Ontario</i>	\$21,770	3 months (01/2018-03/2018)
Principal Investigator	University of Waterloo (Gender Equity Research Grant)	<i>Gender, wage, and geography: Exploring co-op placement gender wage gaps and geographic placement gaps in health-related programs at University of Waterloo</i>	\$10,000	1 year (09/2018 – 08/2019)
Co-Investigator (PI: Nancy Waite)	Ontario Pharmacy Research Collaboration (OPEN)	<i>Equitable access to Ontario pharmacist provided French language medication management services (Applied Health Research Question)</i>	\$23,000	4 months (11/2018 – 03/2019)
Co-PI (with Heidi Fernandes)	Learning Innovation and Teaching Enhancement (LITE) Grant, University of Waterloo	<i>Assessing the effectiveness of a novel wellness check-in activity among third-year pharmacy students</i>	\$6,920	1 year (04/2020 – 04/2021)

**ACADEMIC HONOURS** (asterisk indicates trainee):

1. Canadian Pharmacists Journal 2023 Best Paper Award. For:
  - **Houle SKD**, Alsabbagh MW, Waite NM. Herpes zoster and human papillomavirus vaccination opportunities identified using electronic prompts at the time of scheduling influenza or COVID-19 vaccines. *Can Pharm J* 2023;156(5):257-264.
2. Outstanding Author for the Journal of the American Pharmacists Association. Team recognition for:
  - DeMarco M, Carter CA, Houle SKD, Waite NM. The role of pharmacy technicians in vaccination services: A scoping review. *J Am Pharm Assoc* 2022;62(1):15-26.
3. Outstanding Faculty Mentor in Graduate Program. School of Pharmacy, University of Waterloo. July 2020.
4. Canadian Pharmacists Journal 2019 Best Paper Award. For:
  - Dolovich L, Austin Z, Waite N, Chang F, Farrell B, Grindrod K, **Houle S**, McCarthy L, MacCallum L, Sproule B. Pharmacy in the 21st century: Enhancing the impact of the profession of pharmacy on people's lives in the context of health care trends, evidence and policies. *Can Pharm J* 2019;152(1):45-53. doi: 10.1177/1715163518815717.
5. Best poster, and best audio presentation. Ontario Pharmacists Association conference. June 2017. For:
  - \*Foong AL (presenter), Grindrod KA, Houle SKD. Will I lose my license for that? A closer look at disciplinary hearings and what it means for pharmacists' expanded scope.
6. Best research abstract/ presentation. Canadian Pharmacists Conference. June 2017. For:
  - \*Foong AL (presenter), Edwards DJ, Houle SKD, Grindrod KA. Ready or not? Pharmacist perceptions of a changing injection scope of practice before it happens.
7. Best oral presentation. Waterloo-Wellington Clinical Research & Quality Improvement Symposium. May 2017. For:
  - \*Foong AL (presenter), Edwards DJ, Houle SKD, Grindrod KA. Ready or not? Pharmacist perceptions of a changing injection scope of practice before it happens.
8. Education Sabbatical Grant (\$4,000). Canadian Society of Hospital Pharmacists. May 2017.
9. Travel Award – Institute Community Support. Institute of Health Services and Policy Research – Canadian Institutes of Health Research. April 2017.
10. Canadian Pharmacists Journal 2014 Best Paper Award. For:
  - Houle SKD, Grindrod KA, Chatterley T, Tsuyuki RT. Paying Pharmacists for Patient Care: A Systematic Review of Remunerated Pharmacy Clinical Care Services. *Can Pharm J* 2014 147(4): 209-232.
11. Travel Award – Institute Community Support. Institute of Health Services and Policy Research – Canadian Institutes of Health Research. August 2014.
12. 2014 Canadian Association for Health Services and Policy Research (CAHSPR) Student Travel Bursary. CAHSPR. March 2014.
13. 2013 Canadian Hypertension Congress Student Travel Award. Hypertension Canada. October 2013.
14. 2012 Canadian Hypertension Congress Student Travel Award. Hypertension Canada. October 2012.
15. Outstanding Poster Presentation Award. Young Investigators Forum. Institute of Circulatory and Respiratory Health – Canadian Institutes of Health Research. June 2012.

16. Doctoral Research Award (Hypertension Priority Area). Canadian Institutes of Health Research. April 2012-May 2014. Value: \$30,000/year
17. Young Investigators Forum Travel Award. Institute of Circulatory and Respiratory Health – Canadian Institutes of Health Research. April 2012.
18. Best Research Poster by a Doctoral Student, for *“Opportunities for Improving Hypertension Care in the Community: An Analysis of Over 7 Million BP Kiosk Readings.”* Canadian Hypertension Congress, Hypertension Canada. October 2011.
19. 2011 Canadian Hypertension Congress Student Travel Award. Hypertension Canada. September 2011.
20. Queen Elizabeth II Scholarship – Master’s Level. University of Alberta. September 2011.
21. Graduate Student Scholarship, Alberta Advanced Education and Technology. Government of Alberta. January 2011.
22. 2011 CADTH Student Travel Award, Canadian Agency for Drugs and Technologies in Health. January 2011.
23. Walter H. Johns Graduate Fellowship, University of Alberta Faculty of Graduate Studies and Research. September 2010. Value: \$5,000.
24. Frederick Banting and Charles Best Canada Graduate Scholarship – Master’s Level, Canadian Institutes of Health Research. July 2010. Value: \$17,500
25. Queen Elizabeth II Scholarship – Master’s Level, University of Alberta. September 2009. Value: \$10,800.
26. Campbell Prize for Academic Achievement (Second Most Distinguished Graduate). Saskatchewan College of Pharmacists, 2006.
27. Charles E. Frosst Scholarship. Merck Frosst Canada. October 2005.
28. Saskatchewan College of Pharmacists Bursary. College of Pharmacy and Nutrition, University of Saskatchewan. October 2004.
29. Chandra K. Khandelwal Memorial Scholarship (for excellence in Biochemistry 200 and 211). University of Saskatchewan. March 2004.
30. Nasser Scholarship Fund Award. University of Saskatchewan. October 2003.
31. George A. Hamilton Scholarship. College of Pharmacy and Nutrition, University of Saskatchewan. October 2002.
32. University of Saskatchewan Scholarships. University of Saskatchewan. August 2002 and August 2003.
33. University Undergraduate Scholarships. University of Saskatchewan. July 2002, October 2003, and October 2004.
34. Centennial Merit Scholarship. Government of Saskatchewan. May 2001.

## PROFESSIONAL AWARDS:

1. 2023 Award for Exceptional Achievement in Research and Academia, Ontario Pharmacists Association. September 2023.
2. Wellspring Pharmacy Leadership Award, Canadian Foundation for Pharmacy. May 2015.
3. Magnum Opus Award (sponsored by Takeda Canada) – presented to one pharmacist in each province who has completed specialty education or training and who, as a result, has successfully expanded their professional practice. August 2013.
4. Canadian Society of Hospital Pharmacists Recognition Program Award “Enhancing Patient Care Through Pharmacist Prescribing.” October 2009.
5. Orest Buchko Hospital Pharmacy Award. Canadian Society of Hospital Pharmacists – Saskatchewan Branch. May 2006.
6. CSHP Future Professional Pharmacy Student Award. Canadian Society of Hospital Pharmacists, Saskatchewan Branch. March 2005.

## PEER REVIEW ACTIVITIES:

- Canadian Council for Continuing Education in Pharmacy, phase II accreditation reviewer for pharmacist injection training programs
- Phase 1 reviewer for CIHR Project Grant: Fall 2016 competition. (2017)
- Journals:
  - American Journal of Preventive Medicine
  - Annals of Pharmacotherapy
  - Australian Journal of Primary Health
  - Canadian Family Physician
  - Canadian Journal of Cardiology
  - Canadian Journal of Diabetes
  - Canadian Family Physician
  - Canadian Journal of Hospital Pharmacy
  - Canadian Pharmacists Journal
  - Currents in Pharmacy Teaching and Learning
  - Exploratory Research in Clinical and Social Pharmacy
  - Health Expectations
  - Health Policy
  - Infectious Diseases and Therapy
  - International Journal of Clinical Pharmacy
  - International Journal of Pharmacy Practice
  - JMIR Public Health and Surveillance
  - Journal of Managed Care Pharmacy
  - Journal of the American College of Clinical Pharmacy
  - Journal of the American Pharmacists Association
  - McGill Journal of Medicine
  - Pharmacotherapy
  - Pharmacy
  - Pharmacy Practice
  - PLOS ONE
  - Public Health Reports
  - Research in Social and Administrative Pharmacy

- Travel Medicine and Infectious Disease
- Vaccine
- Vaccines

#### TEACHING ACTIVITIES – COURSE COORDINATION:

- University of Waterloo:

Course Name	Terms
PHARM 329, Professional Practice 5 Laboratory	Winter 2015, 2017-2019, 2021-2023
PHARM 155, Drug Information Fundamentals	Spring 2015, 2017-2019, 2021-2023
Coordinator of injections training curriculum	Spring 2017-2019, 2021-2023
PHARM 653, Methods in Clinical and Applied Research	Winter 2022

#### TEACHING ACTIVITIES – GUEST LECTURES:

- University of Waterloo:

Course Name	Lecture Title	Date
Advanced Women's Health Pharmacotherapeutics	Vaccinations for Women	2022-2023
Systematic Review and Meta-Analysis Workshop	Placing Systematic Reviews in Context vs. Other Types of Reviews	June 2015
Systematic Review and Meta-Analysis Workshop	Systematic Review Critical Appraisal	June 2015
PHARM 610, Topics in Drug Development	From Approval to Administration: An Overview of Health Professionals' Scope of Practice	November 2014
PHARM 227, Health Systems in Canada	Reimbursement for Pharmacists	October 2014
PHARM 490, Professional Practice 6	Refresher on the Administration of IM Injections	October 2014
PHARM 490, Professional Practice 6	Pharmacist Prescribing: My Alberta Experience	October 2014
PHARM 428, Professional Practice 6	Refresher on the Administration of IM Injections	July 2014
PHARM 428, Professional Practice 6	Pharmacist Prescribing: My Alberta Experience	June 2014

- Renison University College (Waterloo, ON):

Course Name	Lecture Title	Date
Health Policy (SWK 601R)	The Expansion of Pharmacare in Ontario (OHIP+)	August 2017

- McMaster University:
  - Michael C. DeGroote School of Medicine, Medical Decision-Making Series. Tutorial facilitator for Clinical Epidemiology session, Waterloo campus, April 2015.
- University of Alberta:

Course Name	Lecture Title	Date
PHARM 430, Comprehensive Patient Care and Assessment 2	End of Life Care: Strategies for Patient Care and Communication	October 2012
PHARM 430, Comprehensive Patient Care and Assessment 2	Intro to Additional Prescribing Authorization	October 2012
PHARM 382, Provincial and Canadian Healthcare	CSHP – Moving Hospital Pharmacy Forward	March 2009
PHARM 387, Pediatrics/Geriatrics	Home Care Pharmacy Services and Case Review	September 2008
PHARM 382, Provincial and Canadian Healthcare	Canadian Society of Hospital Pharmacists: Who We Are and What We Do	January 2008

- Dalhousie University:

Course Name	Lecture Title	Date
PHAR 3013.03, Critical Appraisal Series II	Journal Club – Meet the Author of ‘Effect of a Pharmacist-Managed Hypertension Program on Health System Costs: An Evaluation of the Study of Cardiovascular Risk Intervention by Pharmacists—Hypertension (SCRIP-HTN).	March 2014
PHAR 3013.03, Critical Appraisal Series II	Journal Club – Meet the Author of ‘Effect of a Pharmacist-Managed Hypertension Program on Health System Costs: An Evaluation of the Study of Cardiovascular Risk Intervention by Pharmacists—Hypertension (SCRIP-HTN).	March 2013

#### TEACHING ACTIVITIES – COURSE FACILITATION:

- Interdisciplinary Studies 410, University of Alberta. 2008, 2009, and 2011.

#### UNDERGRADUATE PRECEPTING ACTIVITIES:

Date	Student(s)	Program	Role
June 2023 – Present	Silvia Luk	Volunteer research assistant	Supervisor
Sept. – Dec. 2022	Kyla Barrera	Co-operative Education Work Term	Supervisor
Jan. – Apr. 2021	Karolina Suszek	Co-operative Education Work Term	Co-supervisor



Jan. – Apr. 2021	Hanna Cho	PHARM 401 (Independent Study), University of Waterloo	Second Reader of research project
Sept. – Dec. 2020	Besjana Avdiaj		Co-supervisor
	Ariane Fung		
May – Aug. 2020	Ariane Fung	Co-operative Education Work Term	Co-supervisor
Jan. – Mar. 2020	Kathleen (Katie) Flynn	PHARM 401 (Independent Study), University of Waterloo	Second Reader of research project
Sept. – Dec. 2019	Nastaran Keshmiri		Co-supervisor
	Jocelyn Chan		
	Kathleen (Katie) Flynn		
Nov. 2018 – Mar. 2019	Brittany Cook		Supervisor
	Brenda Oh		Supervisor
Jan. 2019 – Mar. 2019	Fadi Guirguis		Second Reader of research project
Sept. – Dec. 2017	Parinaz Shahrezaei		Second Reader of research project
	Max Chong		Supervisor
Sept. 2017 – Mar. 2018	Ai-Leng Foong		Second Reader of research project
Sept. – Dec. 2017	Kristina Kozlovsky		Supervisor
May – Aug. 2017	Ai-Leng Foong	Co-operative Education Work Term	Co-Supervisor
Jan. – May 2017	Ai-Leng Foong	PHARM 401 (Independent Study), University of Waterloo	Supervisor
Sept. – Dec. 2016	Nareefa Nasrudeen		Second Reader of research project
May – Aug. 2014	Suraya Karzai		Second Reader of research project
Sept. – Dec. 2008	Andreana Marcinkow	4 <sup>th</sup> -year patient care rotation, University of Alberta	Co-Preceptor (home care)
Jan. – Mar. 2007	Erin Harper, Jordan Kiat	3 <sup>rd</sup> -year SPEP rotation, University of Saskatchewan	Preceptor (palliative care)
Oct. – Dec. 2006	Corinne Sloan	2 <sup>nd</sup> year SPEP rotation, University of Saskatchewan	Preceptor (palliative care)

#### GRADUATE SUPERVISION AND COMMITTEE ACTIVITIES:

Date	Student	Thesis Title, Program
<b>Supervisor Role</b>		
Jan. 2021 – Present	Mathew DeMarco (co-supervised with Nancy Waite)	PhD, School of Pharmacy, University of Waterloo
Sept. 2020 – Present	Ali Syed	PhD, School of Pharmacy, University of Waterloo

	(co-supervised with Nancy Waite)	
Sept. 2018 – Present	Ai-Leng Foong (co-supervised with Kelly Grindrod)	PhD, School of Pharmacy, University of Waterloo
Aug. 2022 – Mar. 2024	John Papastergiou (co-supervision with B.J.F. Van den Bemt)	<i>“Exploring the value and implementation of novel point-of-care testing and pharmacogenomic services into community pharmacy practice”</i>  PhD, Radboud University (Netherlands)
Jan. 2018 – Nov. 2019	Heidi Fernandes	<i>“Development and Testing of a Framework for the Assessment of Health-Related Risks Among Travellers by Pharmacists in Ontario”</i>  MSc, School of Pharmacy, University of Waterloo
<b>Committee Member Role</b>		
Oct. 2023 – Present	Shirley Wang	PhD, School of Pharmacy, University of Waterloo
June 2022 – Present	Bincy Baby	MSc, School of Pharmacy, University of Waterloo
Oct. 2021 – Present	Rozhannaa Sothilingam	MSc, School of Pharmacy, University of Waterloo
Sept. 2021 - Present	Mira Maximos	PhD, School of Pharmacy, University of Waterloo
Nov. 2019 – Present	Noor Alsalemi	PhD, Université de Montréal
Sept. 2018 – Present	Razan Amoud	<i>“Influenza Vaccine Effectiveness against Laboratory-Confirmed Influenza among Patients with Cardiovascular Hospitalization”</i>  PhD, School of Pharmacy, University of Waterloo
July 2019 – April 2023	Cindy Yeung	<i>“Pediatric Physiologically Based Pharmacokinetic (PBPK) Modeling to Advance Knowledge of Breastfeeding Infant Exposure to Maternal Medications”</i>  PhD, School of Pharmacy, University of Waterloo
Mar. 2019 – Oct. 2019	Fahad Alzahrani	<i>“Understanding the relationship between pharmacists’ implicit and explicit bias and perceptions of pharmacist services among Arab and Black individuals.”</i>  PhD, School of Pharmacy, University of Waterloo
Sept. 2018 – Apr. 2022	Rand Hussein	<i>“Pharmacy5in5: Evaluating a digital game-based learning intervention to improve pharmacists’ behaviour and optimize medication use.”</i>  PhD, School of Pharmacy, University of Waterloo
Nov. 2017 – Aug. 2019	Feng Tian	<i>“Health and Economic Impact of Treatment-based Strategies on Chronic</i>

		<i>Hepatitis B in Ontario</i> MSc, School of Pharmacy, University of Waterloo
Dec. 2016 – Dec. 2019	Gokul Raj Pullagura	<i>“Shades of gray in vaccine decision making: Understanding, exploring, and addressing the challenges of influenza vaccine hesitancy in Ontario community pharmacies”</i> PhD, School of Pharmacy, University of Waterloo
Sept. 2015 – Jan. 2017	Mo Chen	<i>“An Evaluation of the Effect of Primary Care Pharmacist Interventions on Patients with Chronic Pain”</i> MSc, School of Pharmacy, University of Waterloo
<b>External Examiner Role</b>		
March 2024	Damilola Olufemi-Yusir	<i>“Exploring patient participation in pharmacy medication reviews”</i> PhD, Faculty of Pharmacy and Pharmaceutical Sciences, University of Alberta (final defence)
Apr. – July 2022	Tiffany Lee	<i>“Community pharmacists’ contributions to primary health care in NL”</i> PhD, Faculty of Medicine, Memorial University of Newfoundland (comprehensive examination)
Apr. 2022	Damilola Olufemi-Yusir	<i>“Exploring patient participation in community pharmacy medication reviews”</i> PhD, Faculty of Pharmacy and Pharmaceutical Sciences, University of Alberta (comprehensive examination)
Apr. 2021	Lydia Moussa	<i>“Change facilitation for the implementation of innovation in healthcare practice”</i> PhD, Discipline of Pharmacy, University of Technology Sydney
Nov. 2020	Razan Amoud	PhD, School of Pharmacy, University of Waterloo (comprehensive examination)
Nov. 2019	Cassandra Woit	<i>“Prescribing Competence and Confidence in Pharmacy and Medicine”</i> MSc, Faculty of Pharmacy and Pharmaceutical Sciences, University of Alberta
Mar. 2017	Karla Lancaster	<i>“Program for the Identification of Actionable Atrial Fibrillation – Analysis of Professional Pharmacy Services (PIAFF-PPS): An analysis of service recipients following community pharmacy screening”</i> MSc (Health Research Methodology), McMaster University
Feb. 2017	Alexandra Stanhope	<i>“Parents’ Experiences with Learning to Manage Medications in Pediatric Rehabilitation”</i>

		MSc (Health Services Research), Institute of Health Policy, Management and Evaluation, University of Toronto
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#### **EDITORIAL ACTIVITIES:**

Jun. 2015 – Present	Editorial Board Member, Research in Social and Administrative Pharmacy (RSAP) journal.
Nov. 2018 – Mar. 2019	Academic Editor, PLOS ONE
Sept. 2018	Guest Academic Editor, PLOS ONE

#### **ADVISORY COMMITTEES AND OTHER PROFESSIONAL ACTIVITIES:**

April 2024 – Present	Member, Federation of Medical Women of Canada Maternal RSV Task Force
April 2023 – Present	Representative of University of Waterloo, Association of Faculties of Pharmacy of Canada Research Committee
June 2023 – Present	Project Advisory Committee member, Ontario Pharmacists Association Workforce Planning for Ontario Pharmacists and Pharmacy Technicians
April 2021 – Present	Member, Ontario College of Pharmacists Assurance and Improvement in Medication Safety (AIMS) Safety Insights Group
March 2021 – Present	Learning Review Panelist, Canadian Council on Continuing Education in Pharmacy (CCCEP)
June 2019 – Present	Steering Council member, Pharmacists Professional Group. International Society of Travel Medicine. Chair-elect effective July 2023
Sept. 2017 – Present	Columnist (Travel Health), <i>Pharmacy Practice + Business</i> magazine
Nov. 2016 – Present	Executive Committee Member, Ontario Pharmacy Evidence Network (OPEN)
September 2019	HeForShe Gender Equity Research Grant committee member, University of Waterloo
May 2020 – Mar. 2021	Member, Canadian Pharmacists Association Influenza Vaccination Preparedness Group (task force)
Mar. 2015 – Oct. 2018	Member, Ontario Ministry of Health and Long-Term Care Pharmacy Travel Vaccines Working Group

Jun. 2017 – May 2018	Expert Assistance for Ontario College of Pharmacists Discipline Committee
Jul. 2016 – Apr. 2017	Expert Advisory Committee Member for <i>The Value of Expanded Pharmacy Services in Canada</i> , The Conference Board of Canada
Jun. 2012 – Jun. 2016	Moderator, ADAPT Patient Care Skills Development Program, Canadian Pharmacists Association
Sept. 2012	Assessor for the Pharmacy Examining Board of Canada's Objective Structured Performance Evaluation (OSPE) for Pharmacy Technicians
May 2014, Nov. 2010, May 2010, May 2009	Assessor for the Pharmacy Examining Board of Canada's Objective Structured Clinical Examination. Kitchener-Waterloo (2014), Calgary (Nov. 2010) and Edmonton (May 2009 and 2010)

#### **APPOINTMENTS, PROFESSIONAL AUTHORIZATIONS, AND VOLUNTEER ACTIVITIES:**

May 2019 – April 2021	Past-chair, Knowledge to Practice Advisory Circle, Canadian Pharmacists Association.
Oct. 2018	Certificate in Travel Health™ (CTH), International Society of Travel Medicine
Jun. 2017 – May 2019	Chair, Knowledge to Practice Advisory Circle (formerly Canadian Pharmacy Practice Research Group), Canadian Pharmacists Association.
May 2017 – May 2018	Member, Canadian Society of Hospital Pharmacists Ontario Branch pharmacist prescribing working group
Jun. 2016 – Jun. 2017	Chair-Elect, Canadian Pharmacy Practice Research Group Executive Committee, Canadian Pharmacists Association
May 2015 – May 2016	Member, Pharmacists' Practice Committee, Ontario Pharmacists Association.
Feb. 2014 – Jun. 2016	Member-at-Large, Canadian Pharmacy Practice Research Group Executive Committee
Nov. 2012	Authorization to administer drugs by injection granted by the Alberta College of Pharmacists.
Aug. 2012 – Aug. 2014	Alberta Branch Delegate, national council of the Canadian Society of Hospital Pharmacists.

Jun. 2012 – Apr. 2014	Member of Alberta College of Pharmacists Hearing Tribunal Committee.
Oct. 2010 – Jun. 2014	Awards committee appraiser, Canadian Society of Hospital Pharmacists.
Oct. 2010 – Oct. 2012	Member of the Practice Standards Steering Committee, Canadian Society of Hospital Pharmacists.
Aug. 2010 – Dec. 2011	Committee member for the development of the Knowledge Assessment for the Alberta College of Pharmacists' Competence Program
Feb. 2009 – Dec. 2011	Member of pharmacist consultation group for public awareness campaigns by the Alberta College of Pharmacists
Oct. 2007 – Oct. 2010	Presidential Officer (Internal Portfolio) – CSHP Alberta Branch
Nov. 2009	Member of working group to review the Competency Profile for Alberta Pharmacists, Alberta College of Pharmacists. Edmonton AB.
Feb. 2009	Additional Prescribing Authorization granted by the Alberta College of Pharmacists
Oct. 2006 – Oct. 2007	Treasurer – CSHP Alberta Branch
May 2006	Admissions Assessor – College of Pharmacy and Nutrition, University of Saskatchewan
Mar. 2005	Student Representative, Canadian Council for Accreditation of Pharmacy Programs – University of Saskatchewan

#### **PROFESSIONAL AFFILIATIONS:**

- Licensure with Ontario College of Pharmacists, 2014 – present
- Licensure with Alberta College of Pharmacists, 2006 – 2014
- Membership:
  - Canadian Association for Immunization Research and Evaluation (CAIRE)
  - Canadian Immunization Research Network (CIRN)
  - Canadian Pharmacists Association
  - International Society of Travel Medicine
  - Ontario Pharmacists Association
  - Faculty of Travel Medicine, Royal College of Physicians and Surgeons of Glasgow